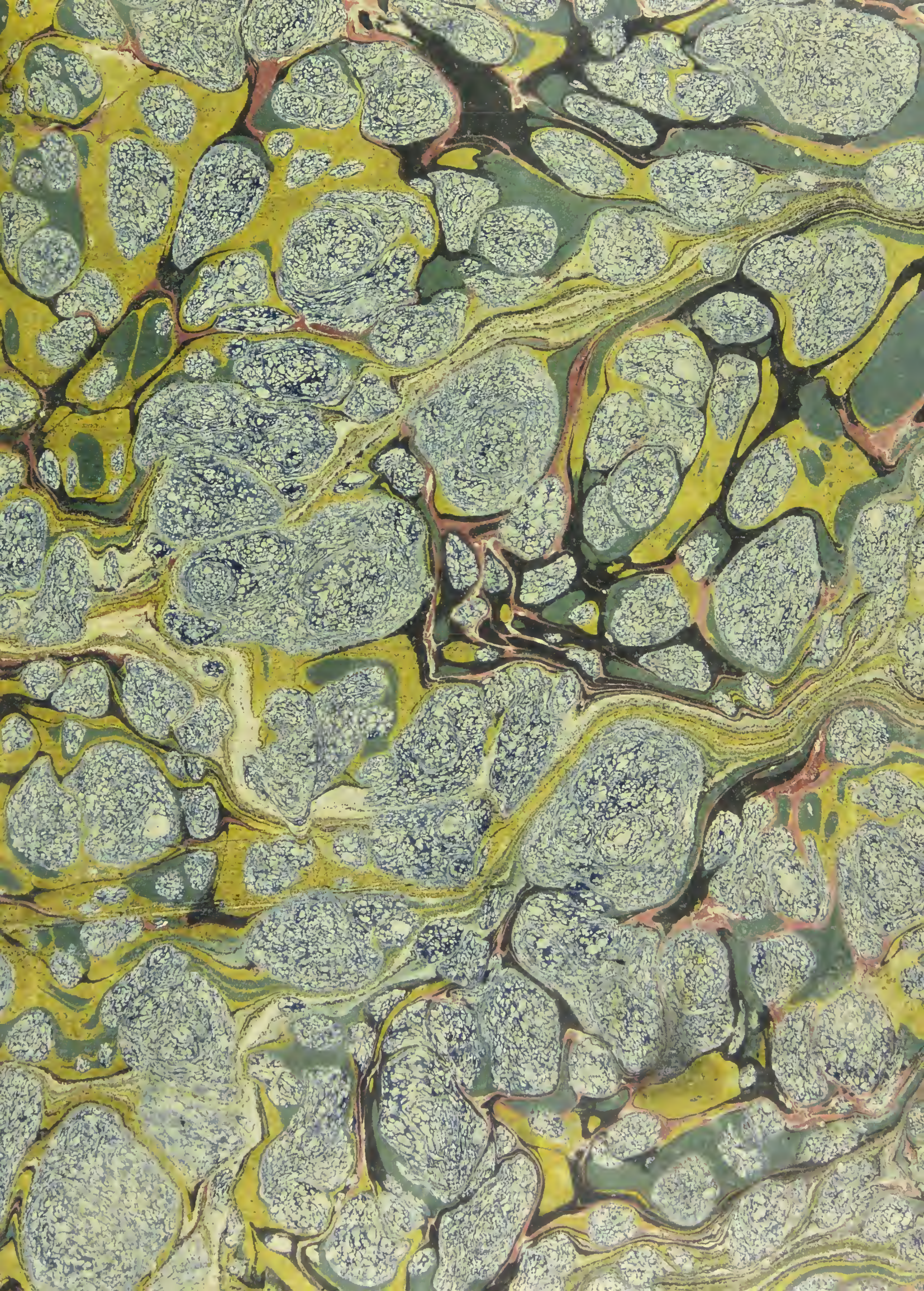


Auth. J. G. Wright. Biddulph.



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THE
ENGLISH ENCYCLOPÆDIA:

BEING
A COLLECTION OF TREATISES,
AND
A DICTIONARY OF TERMS,
ILLUSTRATIVE OF THE
ARTS AND SCIENCES.

COMPILED FROM MODERN AUTHORS OF THE FIRST EMINENCE IN THE DIFFERENT
BRANCHES OF SCIENCE.

IN TEN VOLUMES.

THE WHOLE ILLUSTRATED WITH UPWARDS OF FOUR HUNDRED COPPER-PLATES.

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ENGLISH ENCYCLOPÆDIA.

G L A

GLASTONBURY, a town of Somersetshire, with a market on Tuesday. It is seated near a high hill called the Tor, and is noted for a famous abbey, some magnificent ruins of which are still remaining; but they have been much diminished for the sake of the stones: however, the curious structure called the abbot's kitchen is entire, and is of a very unusual contrivance. The only manufacture here is stockings; but the chief support of the place is the resort of people to see the ruins of the abbey. The George Inn was formerly called the Abbot's Inn, because it was a receptacle for the pilgrims that came to the abbey. It was pretended that the bodies of Joseph of Arimathea, of king Arthur, and of king Edward the Confessor, were buried here. The last abbot of this place was hanged on the top of the Tor, by order of king Henry VIII. for not acknowledging his supremacy. This place is at present pretty large and well built, containing two parish churches. Nearly adjoining, on a high steep hill, is placed a tower, which commands an extensive prospect, and serves as a landmark to seamen. It is six miles S. W. of Wells, and 129 W. by S. of London. Lon. 2. 40. W. Lat. 51. 8. N.

GLATZ, a handsome well fortified town of Bohemia, capital of a county of the same name. It is seated on the river Neisse, and has a strong castle built upon a mountain. This county was ceded to the king of Prussia by the queen of Hungary in 1742, and is about 45 miles in length, and 25 in breadth. It has mines of coal, silver, and iron, good quarries, plenty of cattle, and fine springs of mineral waters. The town is 45 miles from Breslaw, and 82 E. by N. of Prague. Lon. 16. 50. E. Lat. 50. 25. N.

GLAUBER (John Rodolphus), a celebrated German chemist, who flourished about the year 1646. He wrote a great number of different treatises on chemistry, some of which have been translated into Latin and French. All his works have been collected into one volume, entitled, *Glauberus concentratus*, which has been translated into English, and was printed at London in folio in 1689.

GLAUBER'S Salts, a kind of purging salts, now called by the London College *natron citriolatum*. Every one is acquainted with their properties. See **CHEMISTRY**, page 414.

GLAUCOMA, in surgery, a species of cataract wherein the crystalline humour of the eye is of a blueish or greenish colour, and its transparency diminished. The word comes from *γλαυκος*, *cerfus*, "sea green, sky-coloured, or greyish." See **SURGERY**.

GLAUCUS, a marine god, or deity of the sea. There are a great many fabulous accounts of this divinity: but the poetical history of him is, that, before his deification, he was a fisherman of the town of Anthedon, who having one day taken a considerable number of fishes, which he laid upon the bank, on a sudden perceived that these fishes, having touched a kind of

herb that grew on the shore, received new strength, and leaped again into the sea; upon the sight of which extraordinary accident, he was tempted to taste of the herb himself, and presently leaped into the sea after them, where he was metamorphosed into a Triton, and became one of the sea-gods.

GLAUX, in botany; a genus of the monogynia order, belonging to the pentandria class of plants, and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is monophyllous; there is no corolla: the capsule is unilocular, quinquevalved, and pentaspermous.

GLAZIER, an artificer who works in glass. The principal part of a glazier's business consists in fitting panes of glass to the sashes and window-frames of houses, pictures, &c. and in cleaning the same when required.

GLAZING, the crusting over earthen ware by a vitreous substance, the basis of which is lead. See **GLASS of Lead**. The workers of common earthen ware, however, are not at the trouble of thus previously making a pure glass of lead. Their usual composition for glazing their ware is formed of white sand 40 pounds, of red lead 20 pounds, of pearl-ashes 20 pounds, and of common salt 12 pounds. Powder the sand by grinding it, and then add it to the other ingredients and grind them together: after which calcine them for some time with a moderate heat, and when the mixture is cold, reduce it to powder; and when wanted for use temper it with water. The proportion of these ingredients may be occasionally varied. The ware, after being turned on the wheel and dried in the open air, is covered over with the above composition by means of a brush; and when set in the furnace, the violent heat soon reduces it to a perfect glass, covering the whole internal and external surface of the vessel. We may observe, however, that lead, being poisonous, ought to be excluded from the composition of glazings, and other fluxes substituted in its stead. A transparent glazing may be prepared without lead by calcining 40 pounds of white sand, 25 pounds of pearl-ashes, and 15 pounds of common salt, and proceeding as before: and a more perfect transparent glazing may be made of sand 40 pounds, of wood-ashes perfectly burned 50 pounds, of pearl-ashes 10 pounds, and of common salt 12 pounds. The following receipts are taken for the most part from Kunckel, who says that they are the true glazings used at Delft and other Dutch manufactories.

Black is made of eight parts of red-lead, iron-filings three, copper-ashes three, and zaffer two measures. This when melted will make a brown-black; and if wanted blacker, add more zaffer to it.

Blue is thus prepared: Take lead-ashes or red-lead, one pound; clear sand or powdered flints, two pounds; common salt, two pounds; white calcined tartar, one pound; Venice or other glass, half a pound; zaffer, half a pound; mix them well together and melt them for several times, quenching them always in cold

water. If you would have it fine and good, it will be proper to put the mixture into a glass furnace for a day or two. Another blue glazing may be formed of one pound of tartar, a quarter of a pound of red-lead, half an ounce of zaffer, and a quarter of a pound of powdered flints, which are to be fused and managed as in the last receipt. Or, take two pounds of calcined lead and tin, add five pounds of common salt, five pounds of powdered flints, and of zaffer, tartar, and Venetian glass, each one pound. Calcine and fuse the mixture as before. Or again, take of red-lead one part, of sand three parts, and of zaffer one part. For a violet blue glazing, take four ounces of tartar, two ounces of red-lead, five ounces of powdered flints, and half a dram of manganese.

Brown is made of red-lead and flints, of each 14 parts, and of manganese two parts fused; or of red-lead 12 parts, and manganese one part fused. A brown glazing, to be laid on a white ground, may be made of manganese two parts, and of red-lead and white-glass, of each one part, twice fused.

Fls-b-coloured is made of 12 parts of lead-ashes, and one of white-glass.

Gold-coloured. Take of litharge three parts, of sand or calcined flint one part; pound and mix these very well together, then run them into a yellow glass with a strong fire. Pound this glass, and grind it into a subtile powder, which moisten with a well-saturated solution of silver; make it into a paste, which put into a crucible, and cover it with a cover. Give at first a gentle degree of fire; then increase it, and continue it till you have a glass, which will be green. Pound this glass again, and grind it to a fine powder; moisten this powder with some beer, so that by means of an hair-pencil you may apply it upon the vessels or any piece of earthen ware. The vessels that are painted or covered over with this glazing must be first well heated, then put under a muffle; and as soon as the glass runs, you must smoke them by holding them over burning vegetables, and take out the vessels. Mr. Hiesinus of Petersburg, who sent this receipt to the Royal Society, uses the words *afflare debet fumum*, which is rendered *smoke them* in the Transactions. See Phil. Trans. N^o 465. sect. 6.

Kunckel gives several preparations for a gold-coloured yellow glazing. This may be produced by fusing a mixture of three parts of red-lead, two parts of antimony, and one part of saffron of Mars; by again melting the powdered mass, and repeating the operation four times, or by fusing four or five times a composition of red-lead and antimony, of each an ounce, and of scales of iron, half an ounce; or by calcining and fusing together eight parts of red-lead, six parts of flint, one part of yellow ochre, one part of antimony, and one part of white glass. A transparent gold-coloured glazing may be obtained by twice fusing red-lead and white flints, of each 12 parts, and of filings of iron, one part.

Green may be prepared of eight parts of litharge or red-lead, eight parts of Venice glass, four parts of brass-dust or filings of copper, or of ten parts of litharge, twelve of flint or pebble, and one of *res usum* or copper-ashes. A fine green glazing may be produced by fusing one part of the Bohemian granate, one part of filings of copper, one part of red-lead, and one part of Venetian glass; or by fusing one part of white glass, the same quantity of red-lead, and also of filings of copper; powdering the mass, and adding one part of Bohemian granate to two parts of this powder. A fine green may be obtained by mixing and grinding together any of the yellow glazings with equal quantities of the blue glazings; and all the shades and tints of green will be had by varying the proportion of the one to the other, and by the choice of the kind of yellow and blue.

Sea-green is made of five pounds of lead-ashes, one pound of tin ashes, three pounds of flint, three quarters of a pound

of salt, half a pound of tartar, and half a pound of copper-dust.

Iron-colour is prepared of 15 parts of lead-ashes or red-lead, 14 of white-sand or flints, and five of calcined copper. This mixture is to be calcined and fused.

Liver-colour is prepared of 12 parts of litharge, eight of salt, six of pebble or flint, and one of manganese.

Purple brown consists of lead-ashes, 15 parts; clean sand or powdered flints, 18 parts; manganese, one part; and white glass, 15 measures; to which some add one measure of zaffer.

Red is made of antimony, three pounds; litharge or red-lead, three; and rust of iron, one; grind them to a fine powder. Or, take two pounds of antimony, three of red-lead, and one of calcined saffron of Mars, and proceed as before.

White. The white glazing for common ware is made of 40 pounds of clear sand, 75 pounds of litharge or lead-ashes, 26 of pot-ashes, and 10 pounds of salt; these are three times melted into a cake, quenching it each time in clear cold water. Or it may be made of 50 pounds of clean sand, 70 of lead-ashes, 30 of wood-ashes, and 12 of salt. For a fine white: Take two pounds of lead and one of tin; calcine them to ashes: of this take two parts; calcined flint, white sand, or broken white glass, one part; and salt, one part; mix them well together, and melt them into a cake for use. The trouble of calcining the tin and lead may be prevented by procuring them in a proper state. A very fine white glazing may be obtained by calcining two parts of lead and one part of tin; and taking one part of this mass, and of flints and common salt, of each one part, and fusing the mixture. A white glazing may be also prepared by mixing 100 pounds of masticot, 60 pounds of red-lead, 20 pounds of calcined tin or putty, and 10 pounds of common salt, and calcining and powdering the mixture several times.

Yellow is prepared of red-lead, three pounds; calcined antimony and tin, of each two pounds; or, according to some, of equal quantities of the three ingredients. These must be melted into a cake, then ground fine; and this operation repeated several times: or it may be made of 15 parts of lead-ore, three parts of litharge of silver, and 15 parts of sand. A fine yellow glazing may be procured by mixing five parts of red-lead, two parts of powdered brick, one part of sand, one part of the white glazings, and two parts of antimony, calcining the mixture and then fusing it. Or, take four parts of white-glass, one part of antimony, three parts of red-lead, and one part of iron-scales, and fuse the mixture; or fuse 16 parts of flints, one part of iron-filings, and 24 parts of litharge. A light yellow glazing may be produced with ten parts of red-lead, three parts of antimony, and three of glass, and two parts of calcined tin. See *Gold-colour* above. A *citron yellow* is made of six parts of red-lead, seven parts of fine red brick-dust, and two parts of antimony. This mixture must be calcined day and night for the space of four days, in the ash-hole of a glass-house furnace, and at last urged to fusion. For the glazing of Delft-ware, Porcelain, Stone-ware, &c. see the articles *DELFT-Ware*, *PORCELAIN*, and *POTTERY*.

The Romans had a method of glazing their earthen vessels, which in many respects appears to have been superior to ours. The common brown-glazing easily scales off, cracks, and in a short time becomes disagreeable to the eye. Besides, it is very easily destroyed by acids; nor can vessels glazed in this manner be even employed to hold water, without part of it oozing through their pores. Lead is also very destructive to the human body; and if acids are unwarily put into vessels glazed with lead, the liquors will receive a very dangerous impregnation from the metal. The Roman glazing, which is yet to be seen upon urns dug up in several places, appears to have been made of some kind of varnish; and Pliny gives us a hint that it was made of bitumen. He tells us that it never lost its

beauty, and that at length it became customary to glaze their statues in this manner. As this varnish sunk deep into the substance of the ware, it was not subject to those cracks and flaws which disfigure our vessels; and as it was not liable to be corroded by acids, it could not be subject to any of the accidents which may ensue from the use of vessels glazed with lead.

GLEAD, or GLADE, a name used in the northern parts of the kingdom for the kite. See FALCO.

GLEAM is popularly used for a ray or beam of light. Among falconers a hawk is said to gleam when she casts or throws up filth from the gorge.

GLEANNING, the act of gathering or picking up the ears of corn left behind after the field has been reaped and the crop carried home. By the customs of some countries, particularly those of Melun and Estampes, all farmers and others are forbidden, either by themselves or servants, to put any cattle into the fields, or prevent the gleanings in any manner whatever for the space of 24 hours after the carrying off the corn, under penalty of confiscation.

GLEBE, among miners, signifies a piece of earth in which is contained some mineral ore.

GLEBE, in law, the land belonging to a parish-church besides the tithes.

GLECHOMA, GROUND-IVY; a genus of the gymnospermia order, belonging to the didynamia class of plants, and in the natural method ranking under the 42d order, *Verticillatæ*. Each pair of the antheræ come together in the form of a cross; the calyx is quinquefid. There are three species, the most remarkable of which is the hederacea, or common ground-ivy, which is so well known that it requires no description. Many virtues were formerly attributed to this plant, which it is now found not to be possessed of. Some however it has. The leaves are thrown into the vat with ale, to clarify it and give it a flavour. Ale thus prepared is often drunk as an antiscorbutic. The expressed juice, mixed with a little wine, and applied morning and evening, is said to destroy specks upon horses' eyes. The plants that grow near it do not flourish. It is said to be hurtful to horses if they eat much of it. Sheep eat it; horses are not fond of it; cows, goats, and swine refuse it.

GLEDISTIA, TRIPLE-THORNED ACACIA, or *Honey-locust*; a genus of the diccia order, belonging to the polygamia class of plants, and in the natural method ranking under the 33d order, *Lomentaceæ*. The hermaphrodite calyx is quadrifid, the corolla tetrapetalous, the stamina six, one pistil and legumen. The male calyx is triphyllous; the corolla tripetalous, with six stamina. The female calyx is pentaphyllous, the corolla pentapetalous, one pistil and legumen.

There are two species. 1. The *triacanthos*, a native of Virginia and Pennsylvania, is of an upright growth, and its trunk is guarded by thorns of three or four inches in length in a remarkable manner. These thorns have also others coming out of their sides at nearly right angles: their colour is red. The branches are smooth, and of a white colour. These are likewise armed with red thorns, that are proportionably smaller: they are of several directions, and at the ends of the branches often stand single. The young shoots of the preceding summer are perfectly smooth, of a reddish green, and retain their leaves often until the middle of November. Although there is a peculiar oddity in the nature and position of the spines, yet the leaves constitute the greatest beauty of these trees: they are doubly pinnated, and of a delightful shining green. The pinnated leaves that form the duplication do not always stand opposite by pairs on the middle rib; the pinnæ of which they are composed are small and numerous; no less than 10 or 11 pair belong to each of them; and as no less than 4 or 5 pair of small leaves are arranged along the middle rib, the whole compound leaf consists often of more than 200 pinnæ

of this fine green colour: they sit close, and spread open in fine weather; though during bad weather they will droop, and their upper surfaces nearly join, as if in a sleeping state. The flowers are produced from the sides of the young branches in July: they are a greenish catkin, and make little show; though many are succeeded by pods that have a wonderful effect; for these are exceedingly large, more than a foot, sometimes a foot and a half in length, and two inches in breadth, and of a nut-brown colour when ripe, so that the effect they occasion, when hanging on the sides of the branches, may easily be guessed.—There is a variety of this species with fewer thorns, smaller leaves, and oval pods. It has nearly the resemblance of the other; though the thorns being not so frequent, and the pods being smaller, each containing only one seed, this sort loses that singular effect which the other produces by them. These trees are easily propagated. We receive the seeds from America in the spring, which keep well in the pods, and are for the most part good. They generally arrive in February; and, as soon as possible after, they should be sown in a well-sheltered warm border of light sandy earth. If no border is to be found that is naturally so, it may be improved by applying drift sand, and making it fine. The seeds should be sown about half an inch deep, and they will for the most part come up the first spring. If the summer should prove dry, they must be constantly watered; and if shade could be afforded them in the heat of the day, they would make stronger plants by the autumn. A careful attention to this article is peculiarly requisite; for, as the ends of the branches are often killed, if the young plant has not made some progress, it will be liable to be wholly destroyed by the winter's frost, without protection: and this renders the sowing the seeds in a warm border under an hedge in a well-sheltered place necessary; for there these shrubs will endure our winters, even when seedlings, and so will require no farther trouble; nay, though the tops should be nipped, they will shoot out again lower, and will soon overcome it. It will be proper to let them remain two years in the seed-bed before they are planted out in the nursery. The spring is the best time for the work. Their distances should be one foot by two; the rows should be dug between every winter; and, being weeded in summer, here they may be left, with no other particular care, until they are set out to remain. These trees are late in the spring before they exhibit their leaves, but keep shooting long in the autumn. 2. The other species is the *inermis*, the stem of which is unarmed or without thorns. It is a native of South America, and in this country requires to be kept in a stove.

GLEET, in surgery, a thin purulent or limpid discharge from the urethra. See SURGERY.

GLENOIDES, the name of two cavities, or small depressions in the inferior part of the first vertebra of the neck. See ANATOMY, page 165.

GLICAS, or GLYCAS, (Michael), a Greek historian about the middle of the 15th century, lived in Sicily, and wrote Annals of what passed from the creation of the world to the death of Alexis Comnenus in 1118. Leunclavius added to it a fifth part, which carries it down to the taking of Constantinople. Glicas was also the author of several useful and curious letters.

GLIMMER, or GLIST. See MICA.

GLINUS, in botany; a genus of the pentagynia order, belonging to the decandria class of plants, and in the natural method ranking under the 22d class, *Cary. phyllæi*. The calyx is pentaphyllous, there is no corolla, the nectarium is composed of bristly bristles, the capsule is quinqueangular, quinquelocular, quinquevalved, and polyspermous.

GLIRES, the name of Linnæus's fourth order of mammalia. See ZOOLOGY.

GLISSON (Francis), a learned English physician in the 17th century, was educated at Cambridge, and was made regius professor of that university. In 1634 he was admitted a fellow of the college of physicians in London. During the civil wars he practised physic at Colechester, and afterwards settled in London. He greatly improved physic by his anatomical dissections and observations, and made several new discoveries of singular use towards establishing a rational practice. He wrote, 1. *De ratione animæ*, &c. 2. *De lymphæductis nuper reperi- tis*; with the *Anatomica prolegomena*, & *Anatomia hepatis*. 3. *De natura substantiæ energetica; seu de via vite naturæ, ejusque tribus primis facultatibus*, &c. quarto. 4. *Tractatus de nervulo & intestinis*, &c. The world is obliged to him for the *capitula communis*, or *va. ina portæ*.

GLISTER, in surgery. See CLYSTER.

GLOBBA, in botany; a genus of the monogynia order, belonging to the monandria class of plants. The corolla is equal and trisid, the calyx trisid above, the capsule trilocular, with many seeds.

GLOBE, in geometry, a round or spherical body more usually called a *sphere*. See SPHERE.

GLOBE is more particularly used for an artificial sphere of metal, plaster, paper, or other matter, on whose convex surface is drawn a map or representation either of the earth or heavens, with the several circles conceived thereon. See GEOGRAPHY, p. 740. Globes are of two kinds, *terrestrial* and *celestial*, each of very considerable use, the one in astronomy and the other in geography, for performing many of the operations thereof in an easy obvious manner, so as to be conceived without any knowledge of the mathematical grounds of those arts. The fundamental parts, common to both globes, are an axis, representing that of the world, and a spherical shell or cover, which makes the body of the globe, on the external surface of which the representation is drawn. See AXIS, POLE, &c.

The globes commonly used are composed of plaster and paper in the following manner: A wooden axis is provided, somewhat less than the intended diameter of the globe, and into the extremes thereof two iron wires are driven for poles: this axis is to be the beam or basis of the whole structure. On the axis are applied two spherical or rather hemispherical caps, formed on a kind of wooden mould or block. These caps consist of pasteboard or paper, laid one lay after another on the mould to the thickness of a crown-piece; after which, having stood to dry and embody, making an incision along the middle, the two caps thus parted are slipped off the mould. They remain now to be applied on the poles of the axis, as before they were on those of the mould: and to fix them in their new place, the two edges are sewed together with pack-thread, &c.

The rudiments of the globe thus laid, they proceed to strengthen and make it smooth and regular. In order to this, the two poles are halped in a metalline semicircle of the size intended; and a kind of plaster made of whiting, water, and glue, heated, melted, and incorporated together, is daubed all over the paper-surface. In proportion as the plaster is applied, the ball is turned round in the semicircle, the edge whereof pares off whatever is superfluous and beyond the due dimension, leaving the rest adhering in places that are short of it. After such application of plaster the ball stands to dry; which done, it is put again in the semicircle, and fresh matter applied: thus they continue alternately to apply the composition and dry it, till such time as the ball every where accurately touches the semicircle; in which state it is perfectly smooth, regular, and complete.

The ball thus finished, it remains to paste the map or description thereon: in order to this, the map is projected in several

gores or gussets; all which join accurately on the spherical surface, and cover the whole ball. To direct the application of these gores, lines are drawn by a semicircle on the surface of the ball, dividing it into a number of equal parts corresponding to those of the gores, and subdividing those again answerably to the lines and divisions of the gores.

The papers thus pasted on, there remains nothing but to colour and illuminate the globe, and to varnish it, the latter to resist dust, moisture, &c. The globe itself thus finished, they hang it in a brass meridian, with an hour-circle and a quadrant of altitude, and thus fit it into a wooden horizon.

To describe the gores or gussets for the globes. In Chambers's Dictionary the following method is directed: "1. From the given diameter of the globe find a right line AB, fig. 1. pl. 44. equal to the circumference of a great circle, and divide it into 12 equal parts. 2. Through the several points of division, 1, 2, 3, 4, &c. with the interval of ten of them, describe arches mutually intersecting each other in D and E; these figures or pieces, duly pasted or joined together, will make the whole surface of the globe. 3. Divide each part of the right line AB into 30 equal parts, so that the whole line AB, representing the periphery of the equator, may be divided into 360 degrees. 4. From the poles D and E, fig. 2. with the interval of $23\frac{1}{2}$ deg. describe arches *ab*; these will be twelfth-parts of the polar circles. 5. After the like manner, from the same poles D and E, with the interval of $66\frac{1}{2}$ deg. reckoned from the equator, describe arches *cd*; these will be twelfth parts of the tropics. 6. Through the degree of the equator *e*, corresponding to the right ascension of any given star and the poles D and E, draw an arch of a circle, and, taking in the compasses the complement of the declination from the pole D, describe an arch intersecting it in *i*; this point *i* will be the place of that star. 7. All the stars of a constellation being thus laid down, the figure of the constellation is to be drawn according to Bayer, Hevelius, or Flamsteed. 8. Lastly, after the same manner are the declinations and right ascensions of each degree of the ecliptic *d g* to be determined. 9. The surface of the globe thus projected on a plane is to be engraven on copper, to save the trouble of doing this over again for each globe. 10. A ball in the mean time is to be prepared of paper, plaster, &c. as before directed, and of the intended diameter of the globe; on this, by means of a semicircle and style, is the equator to be drawn, and through every 30th degree a meridian. The ball thus divided into twelve parts, corresponding to the segments before projected, the latter are to be cut from the printed paper and pasted on the ball. 11. Nothing now remains but to hang the globe as before in a brazen meridian and wooden horizon, to which may be added a quadrant of altitude made of brass, and divided in the same manner as the ecliptic and equator."

If the declinations and right ascensions of the stars be not given, but the longitudes and latitudes in lieu thereof, the surface of the globe is to be projected after the same manner as before, except that in this case D and E, fig. 2. are the poles of the ecliptic, and *fb* the ecliptic itself; and that the polar circles and tropics, with the equator *gd*, and the parallels thereof, are to be determined from their declinations.

M. De La Lande, in his *Astronomie*, 1771, tom. 3. p. 736, describes the following methods. "To construct celestial and terrestrial globes must be engraved, which are a kind of projection or inclosure of the globe (fig. 3.) similar to what is now to be explained. The length PC of the axis of this curve is equal to a quarter of the circumference of the globe; the intervals of the parallels on the axis PC are all equal, the radii of the circles KDI, which represent the parallels, are equal to the cotangents of the latitudes; and the arches of each, as DI, are nearly equal to the number of the degrees of the breadth of the gore, (which is usually 30) multiplied by the sine of the latitude:

thus there will be found no intricacy in tracing them; but the difficulty proceeds from the variation found in the trial of the gores when pasting them on the globe, and of the quantity that must be taken from the paper, less on the sides than in the middle (because the sides are longer), to apply it exactly to the space that it should cover.

"The method used among workmen to delineate the gores, and which is described by Mr. Bion (*L'usage des Globes, Tome 3.*) and by Mr. Robert de Vaugendy in the 7th volume of the *Encyclopédie*, is little geometrical, but yet is sufficient in practice. Draw on the paper a line AC, equal to the chord of 15° , to make the half breadth of the gore; and a perpendicular PC, equal to three times the chord of 30° , to make the half length: for these papers, the dimensions of which will be equal to the chords, become equal to the arcs themselves when they are pasted on the globe. Divide the height CP into 9 parts, if the parallels are to be drawn in every 10° ; divide also the quadrant BE into 9 equal parts through each division point of the quadrant, as G; and through the corresponding point D of the right line CP draw the perpendiculars HGF and DF, the meeting of which in F gives one of the points of the curve BEP, which will terminate the circumference of the gore. When a sufficient number of points are thus found, trace the outline PIB with a curved rule. By this construction are given the gore breadths which are on the globe, in the ratio of the cosines of the latitudes; supposing these breadths, taken perpendicular to CD, which is not very exact (but it is impossible to prescribe a rigid operation), sufficient to make a plane which shall cover a curved surface, and that on a right line AB shall make lines PA, PC, PB, equal among themselves, as they ought to be on the globe. To describe the circle KDI which is at 30° from the equator: there must be taken above D a point, which shall be distant from it the value of the tangent of 60° , taken out either from the tables, or on a circle equal to the circumference of the globe to be traced; this point will serve as a centre for the parallel DI, which should pass through the point D, for it is supposed equal to that of a cone circumscribing the globe, and which would touch at the point D.

"The meridians may be traced to every 10 degrees by dividing each parallel, as KI, into three parts at the points L and M, and drawing from the pole P, through all these division points, curves, which represent the intermediate meridians between PA and PB (as BR and ST, fig. 4.). The ecliptic may be described by means of the known declination from different points of the equator that may be found in a table; for 10° , it is $3^\circ 58'$; for 20° , $7^\circ 50' = BQ$; for 30° , $11^\circ 29'$, &c."

It is observed in general, that the paper on which charts are printed, such as the *colombier*, shortens itself $\frac{1}{2}$ part or a line in six inches upon an average, when it is dried after printing; this inconvenience must therefore be corrected in the engraving of the gores: if, notwithstanding that, the gores are found too short, it must be remedied by taking from the surface of the ball a little of the white with which it is covered, thereby making the dimensions suitable to the gore as it was printed. But what is singular is, that in drawing the gore, moistened with the paste to apply on the globe, the axis GH lengthens, and the side AK shortens, in such a manner, that neither the length of the side ACK nor that of the axis GEH of the gore are exactly equal to the quarter of the circumference of the globe, when compared to the figure on the copper, or to the numbered sides shown in fig. 4. Mr. Bonne having made several experiments on the dimensions that gores take after they had been parted ready to apply to the globe, and particularly with the paper named *jefus* that he made use of for a globe of one foot in diameter, found that it was necessary to give to the gores on the copper the dimensions shewn in fig. 4. Supposing that the

radius of the globe contained 720 parts, the half breadth of the gore is $AG = 188\frac{5}{8}$, the distance AC for the parallel of 10° degrees taken on the right line LM is 128.1, the small deviation from the parallel of 10° degrees in the middle of the gore ED is 4, the line ABN is right, the radius of the parallel of 10° , or of the circle CEF, is 4083; and so of the others as marked in the figure. The small circular cap, which is placed under H, has its radius 253, instead of 274, which it would have if the sine of 20° had been the radius of it.—For the uses, &c. of the globes, see GEOGRAPHY and ASTRONOMY, with the plates there referred to.

GLOBE-Animal. See the article ANIMALCULE.

GLOBE-Fish. See OSTRACION.

GLOBULARIA, GLOBULAR BLUE DAISY; a genus of the monogynia order, belonging to the tetrandria class of plants, and in the natural method ranking under the 48th order, *Aggregatæ*. The common calyx is imbricated, the proper one tubulated inferior, the upper lip of the florets bipartite, the under one tripartite, the receptacle paleaceous. There are several species, but one only is commonly to be met with in our gardens, viz. the vulgaris, or common blue daisy. It hath broad thick radical leaves three-parted at the ends, upright stalks from about six to 10 or 12 inches high, garnished with spear-shaped leaves, and the top crowned by a globular head of fine blue flowers, composed of many florets in one cup. It flowers in June, and makes a good appearance, but thrives best in a moist shady situation. It is propagated by parting the roots in September.

GLOBULE, a diminutive of globe, frequently used by physiologists in speaking of the red particles of the blood. See BLOOD.

GLOUCESTER, a city of Gloucestershire, with two markets on Wednesday and Saturday. It is seated on the E. side of the Severn, where, by two streams, it makes the isle of Alney. It is a large and well-inhabited place, has been lately much improved, and its four principal streets are admired for the regularity of their junction in the centre of the town. It contains 12 churches, of which six only are in use, beside the cathedral of St. Peter, which is a handsome structure, remarkable for its large cloister and whispering gallery. Gloucester is a city and county of itself, and governed by a mayor, 12 aldermen, and 26 common-council, a town-clerk, and sword-bearer: the mayor is recorder of the city. It contains five hospitals, two free-schools, and a new county gaol, and was fortified with a wall, which king Charles II. after the restoration ordered to be demolished. It sends two members to parliament. The eminent persons buried here were Robert duke of Normandy, eldest son of William the Conqueror, and the unfortunate Edward II. Great quantities of pins are made here. It is 24 miles N. E. by N. of Bristol, and 106 W. by N. of London. W. lon. 2. 16. N. lat. 51. 50.

GLOUCESTERSHIRE, a county of England, is bounded on the west by Monmouthshire and Herefordshire, on the north by Worcestershire, on the east by Oxfordshire and Warwickshire, and on the south by Wiltshire and part of Somersetshire. It is sixty miles in length, twenty-six in breadth, and one hundred and sixty in circumference; containing 1,100,000 acres, 26,760 houses, 162,560 inhabitants, 290 parishes, 140 are impropriations, 129 villages, 2 cities, and 28 market-towns. It sends only 8 members to parliament: 6 for three towns, viz. Gloucester, Tewkesbury, and Cirencester, and two for the county. Its manufactures are woollen cloths of various kinds, mens' hats, leather, pens, paper, bar-iron, edge-tools, nails, wire, tinned-plates, brass, &c.: and of the principal articles of commerce of the county, it exports cheese, 8000 tons; bacon, grain, cyder, 5000l. worth; perry, fish, 4000l. worth, &c. It lies in the diocese that takes its name from the capital, and in the Oxford

circuit. The air of the county is very wholesome, but the face of it is very different in different parts : for the eastern part is hilly, and is called *Cotteswold* ; the western woody, and called the *Forest of Dean* ; and the rest is a fruitful valley, through which runs the river Severn. This river is in some places between two and three miles broad ; and its course through the country, including its windings, is not less than seventy miles. The tide of flood called the *Boar* rises very high, and is very impetuous. It is remarkable that the greatest tides are one year at the full-moon and the other at the new ; one year the night-tides, and the next the day. This river affords a noble conveyance for goods and merchandise of all sorts to and from the county, but it is watered by several others, as the Wye, the Avon, the Isis, the Leden, the Frome, the Stroud, and Windrush, besides the lesser streams, all abounding with fish, the Severn in particular with salmon, conger-eels, and lampreys. The soil is in general very fertile though pretty much diversified, yielding plenty of corn, pasture, fruit and wood. In the hilly part of the county or Cotteswold the air is sharper than in the lowlands ; and the soil, though not so fit for grain, produces excellent pasture for sheep ; so that of the four hundred thousand that are computed to be kept in the county the greater part are fed here. Of these sheep the wool is exceeding fine, and hence it is that this shire is so eminent for its manufacture of cloth, of which fifty thousand pieces are said to have been made yearly, before the practice of clandestinely exporting English wool became so common. In the vale or lower part of the county, through which the Severn passes, the air and soil are very different from those of the Cotteswold : for the former is much warmer, and the latter richer, yielding the most luxuriant pastures ; in consequence of which, numerous herds of black cattle are kept, and great quantities of that excellent cheese for which it is so much celebrated made in it. The remaining part of the county, called the *Forest of Dean*, was formerly almost entirely over-run with wood, and extended 20 miles in length and 10 in breadth. It was then a nest of robbers, especially towards the Severn ; but now it contains many towns and villages, consisting chiefly of miners, employed in the coal-pits, or in digging for or forging iron-ore, with both which the forest abounds. These miners have their particular laws, customs, courts, and judges ; and the king, as in all royal forests, has a swain-mote for the preservation of the vert and venison. This forest was anciently and is still noted for its oaks, which thrive here surprisingly ; but as there is a prodigious consumption of wood in the forges, it is continually dwindling away. A navigable canal is made from the Stroud to Framilode, forming a junction between the Severn and Thames. Another has been begun from Gloucester to Berkeley, on a very extensive scale, and, when completed, will give the former all the advantages of a sea-port. The iron springs in Gloucestershire are : St. Anthony's well, in Abbenhall parish ; at Barrow and Maredon, in Bodington parish ; at Ash-Church, near Tewkesbury ; at Dumbleton, near Winchcomb ; at Easington, near Dursley ; and at Cheltenham. Its ancient fortifications attributed to the Romans, Saxons, or Danes, are at Abston and Wick, and at Dointon, Dixton, Addlethorp, Knole, Over Upton, Hanham, Bodington, and Bourton on the Water.

GLOCHIDION, in botany ; a genus of the syngenesia order, belonging to the monœcia class of plants. There is no calyx ; the corolla consists of six egg-shaped concave petals ; the stamina are three very small inconspicuous filaments, the antheræ cylindric and erect, the female flowers have no calyx, the corolla is parted into six, the pericarpium is a depressed roundish capsule with six cells, the seeds are roundish and solitary.

GLOGAW, a town of Silesia, capital of a duchy of the same name. It is not very large, but is well fortified on the side of Poland. It has a castle with a tower, in which several counsel-

lors were condemned by duke John in 1498 to perish with hunger. Beside the Papists, there is a great number of Protestants and Jews. It was taken by assault by the king of Prussia in 1741. After the peace in 1742, that king settled the supreme court of justice here, it being, next to Breslaw, the most populous place in Silesia. It is seated on the river Oder, 50 miles N. W. of Breslaw, and 115 N. by E. of Prague. E. lon. 16. 31. N. lat. 51. 40.

Little GLOGAW, a town of Silesia, in the duchy of Opelen, subject to the king of Prussia. It is two miles S. E. of Great Glogaw, and 45 N. W. of Breslaw. E. lon. 16. 13. N. lat. 51. 38.

GLORIA PATRI, among ecclesiastical writers. See the article **DOXOLOGY**.

GLORIOSA, **SUPERB LILY** ; a genus of the monogynia order, belonging to the hexandria class of plants, and in the natural method ranking under the 11th order, *Sarmentaceæ*. The corolla is hexapetalous, undulated, and reflected ; the style oblique. There is but one species, a native of Malabar. It hath a thick, fleshy, tuberous root, sending forth from its centre declinated round stalks, growing eight or ten feet long, and garnished with very long narrow leaves running out into a point, terminated by a long tendril. From the upper part of the stalks proceed large flame-coloured drooping flowers, consisting of six widely-spreading reflexed petals. It flowers in June and July, and is of admirable beauty, whence its name of *Gloriosa*, or *Superb Lily*. This plant, being a native of a very warm climate, requires the protection of a hot-house in this country. The flower-stalks shoot forth in March or April ; which, being long and trailing, must have tall sticks placed for their support. The plants are propagated by offsets, which are produced in tolerable plenty, and may be separated any time after the stalks decay, or in spring before new ones arise.

GLOSS, a comment on the text of any author, to explain his sense more fully and at large, whether in the same language or any other. See the article **COMMENTARY**. The word, according to some, comes from the Greek *γλωσσα*, "tongue ;" the office of a *gloss* being to explain the text, as that of the tongue is to discover the mind.

Gloss is likewise used for a literal translation, or an interpretation of an author in another language word for word.

Gloss is also used in matters of commerce, &c. for the lustre of a silk, stuff, or the like.

GLOSSARY, a sort of dictionary, explaining the obscure and antiquated terms in some old author ; such are Du Cange's Latin and Greek Glossaries, Spelman's Glossary, and Kennet's Glossary at the end of his Parochial Antiquities.

GLOSSOPETRA, or **GLOTTOPETRA**, in natural history, a kind of extraneous fossil, somewhat in form of a serpent's tongue ; frequently found in the island of Malta and other parts. See Plate 31. The vulgar notion is, that they are the tongues of serpents petrified ; and hence their name, which is a compound of *γλωσσα*, "tongue," and *πετρα*, "stone." Hence also their traditionary virtue in curing the bites of serpents. The general opinion of naturalists is, that they are the teeth of fishes, left at land by the waters of the deluge, and since petrified.

The several sizes of the teeth of the same species, and those of the several different species of sharks, afford a vast variety of these fossil substances. Their usual colours are black, blueish, whitish, yellowish, or brown, and in shape they usually approach to a triangular figure. Some of them are simple, others are tricuspidate, having a small point on each side of the large one : many of them are quite straight, but they are frequently found crooked and bent in all directions ; many of them are serrated on their edges, and others plain ; some are undulated on

their edges, and slightly serrated on these undulations. They differ also in size as much as in figure; the larger being four or five inches long, and the smaller less than a quarter of an inch.

They are most usually found with us in the strata of blue clay, though sometimes also in other substances, and are frequent in the clay pits of Richmond and other places. They are very frequent also in Germany, but no where so plentiful as in the island of Malta.

The Germans attribute many virtues to these fossil teeth, which they rank amongst their cordial, sudorific, and alexipharmic medicines. The people of Malta, where they are extremely plentiful, hang them about their childrens' necks to promote dentition, and no doubt with the same degree of success as attends that ridiculous imposture known by the name of the *anodyne necklace*.

GLOTTIS, in anatomy, the narrow slit at the upper part of the *aspera arteria*, which is covered by the epiglottis when we hold our breath and when we swallow. The glottis, by its dilatation and contraction, modulates the voice. See ANATOMY, page 192.

GLOVE, a covering for the hand and wrist. Gloves, with respect to commerce, are distinguished into leathern, silk, thread, cotton, worsted, &c. Leathern gloves are made of chamois, kid, lamb, doe, elk, buff, &c. To *throw the glove* was a practice or ceremony very usual among our forefathers, being the challenge whereby another was defied to single combat. It is still retained at the coronation of our kings, when the king's champion casts his glove in Westminster-hall. See CHAMPION. Favyn supposes the custom to have arisen from the eastern nations, who, in all their sales and deliveries of lands, goods, &c. used to give the purchaser their glove by way of livery or investiture. To this effect he quotes Ruth iv. 7. where the Chaldee paraphrase calls *glove* what the common version renders by *shoe*. He adds that the Rabbins interpret by *glove* that passage in the cxxviii Psalm, *In Idumeam extendam calcamentum meum*, "Over Edom will I cast out my shoe." Accordingly, among us, he who took up the *glove* declared thereby his acceptance of the challenge; and as a part of the ceremony, continues Favyn, took the *glove* off his own right hand and cast it upon the ground, to be taken up by the challenger. This had the force of a mutual engagement on each side, to meet at the time and place which should be appointed by the king, parliament, or judges. The same author asserts, that the custom which once obtained of blessing *gloves* in the coronation of the kings of France was a remain of the eastern practice of giving possession with the *glove*, l. xvi. p. 1017, &c. Anciently it was prohibited the judges to wear gloves on the bench; and at present, in the stables of some princes, it is said to be unsafe going in without pulling off the gloves.

GLOVER (Richard), the author of *Leonidas* and several other esteemed works, was the son of Richard Glover, a Hamburgh merchant in London, and was born in St. Martin's-lane in the year 1712. He very early showed a strong propensity and genius for poetry: and while at school he wrote, amongst other pieces, a poem to the memory of Sir Isaac Newton, prefixed to the view of that incomparable author's philosophy published in 4to in 1728 by his intimate friend Dr. Pemberton. But, though possessed of talents which were calculated to excel in the literary world, he was content to devote his attention to commerce, and at a proper period commenced a Hamburgh merchant. He still however cultivated literature, and associated with those who were eminent in science. One of his earliest friends was Matthew Green, the ingenious but obscure author of some admirable poems, which in 1737, after his death, were collected and published by Mr. Glover. In 1737 Mr. Glover married Miss Nunn, with whom he received a handsome for-

tune; and in the same month published *Leonidas*, a poem in 4to, which in this and the next year passed through three editions. This poem was inscribed to Lord Cobham, and on its first appearance was received by the world with great approbation, though it has since been unaccountably neglected. Lord Lyttleton, in a popular publication called *Common Sense*, and in a poem addressed to the author, praised it in the warmest terms; and Dr. Pemberton published *Observations on Poetry*, especially epic, occasioned by the late poem upon *Leonidas*, 1738, 12mo, merely with a view to point out its beauties. In 1739 Mr. Glover published "*London, or the Progress of Commerce*", 4to; and a ballad, intitled *Hosier's Ghost*. Both these pieces seem to have been written with a view to incite the public to resent the misbehaviour of the Spaniards; and the latter had a very considerable effect. The political dissensions at this period raged with great violence, and more especially in the metropolis; and at different meetings of the livery on those occasions, Mr. Glover was always called to the chair and acquitted himself in a very able manner, his conduct being patriotic and his speeches masterly. His talents for public speaking, his knowledge of political affairs, and his information concerning trade and commerce, soon after pointed him out to the merchants of London as a proper person to conduct their application to parliament on the subject of the neglect of their trade. He accepted the office, and in summing up the evidence gave very striking proofs of his oratorical powers. This speech was pronounced Jan. 27, 1742.

In the year 1744 died the Dukes of Marlborough, and by her will left to Mr. Glover and Mr. Mallet 500l. each, to write the *History of the Duke of Marlborough's Life*. This bequest, however, never took place. It is supposed that Mr. Glover very early renounced his share of it; and Mallet, though he continued to talk of performing the task almost as long as he lived, is now known never to have made the least progress in it. About this period Mr. Glover withdrew a good deal from public notice, and lived a life of retirement. He had been unsuccessful in his business; and, with a very laudable delicacy, had preferred an obscure retreat to popular observation, until his affairs should be put on a more prosperous appearance. He had been honoured with the attention of Frederic Prince of Wales, who once presented him with a complete set of the *Classics*, elegantly bound; and, on his absenting himself for some time on account of the embarrassment in his circumstances, he sent him, it is said, 500l. The prince died in March 1751; and in May following Mr. Glover was once more drawn from his retreat by the importunity of his friends, and stood candidate for the place of chamberlain of London. It unfortunately happened that he did not declare himself until most of the livery had engaged their votes, by which means he lost his election.

In 1753 Mr. Glover produced at Drury-lane his tragedy of *Boadicea*, which was acted nine nights in the month of December. It had the advantage of the performance of Mr. Garrick, Mr. Maffop, Mrs. Cibber, and Mrs. Pritchard. From the prologue it seems to have been patronized by the author's friends in the city; and Dr. Pemberton wrote a pamphlet to recommend it. In 1761 Mr. Glover published *Medea*, a tragedy written on the Greek model; but it was not acted until 1767, when it appeared, for the first time, on the stage at Drury-lane for Mrs. Yates's benefit. At the accession of his present Majesty, he appears to have surmounted the difficulties of his situation. In the parliament which was then called, he was chosen member for Weymouth, and continued to sit as such until the dissolution of it. He about this time interested himself about India affairs at one of Mr. Sullivan's elections; and in a speech introduced the fable of the man, horse, and bear; and drew this conclusion, that, whenever merchants made use

of armed forces to maintain their trade, it would end in their destruction.

In 1770, the poem of Leonidas requiring a new edition, it was republished in two volumes 12mo, corrected throughout, and extended from nine books to twelve. It had also several new characters added, besides placing the old ones in new situations. The improvements made in it were very considerable; but we believe the public curiosity at this period was not sufficiently alive to recompence the pains bestowed on this once popular performance. The calamities arising from the wounds given to public credit in June 1772 by the failure of the bank of Douglas, Heron, and Co. in Scotland, occasioned Mr. Glover's taking a very active part in the settling those complicated concerns, and in stopping the distress then so universally felt. In February 1774, he called the annuitants of that banking-house together at the King's Arms tavern, and laid proposals before them for the security of their demands, with which they were fully satisfied. He also undertook to manage the interests of the merchants and traders of London, concerned in the trade to Germany and Holland, and of the dealers in foreign linens, in their application to parliament in May 1774. Both the speeches made on these occasions were published in a pamphlet in that year. In the succeeding year he engaged on behalf of the West-India merchants in their application to parliament, and examined the witnesses and summed up the evidence in the same masterly manner he had done on former occasions. For the assistance he afforded the merchants in this business, he was complimented by them with a service of plate, of the value of 300l. The speech which he delivered in the house was in the same year printed. This, we believe, was the last opportunity he had of displaying his oratorical talents in public. Having now arrived at a period of life which demanded a recess from business, Mr. Glover retired to ease and independence, and wore out the remainder of his days with dignity and with honour. It is probable that he still continued his attention to his muse, as we are informed that, besides an epic poem of considerable length, he has left some tragedies and comedies behind him in manuscript. After experiencing for some time the infirmities of age, he departed this life 25th November 1785; leaving behind him a most estimable character as a man, a citizen, and a writer.

GLOW-WORM, in zoology. See LAMPYRIS.

GLUCKSTADT, a considerable town of Germany, in the circle of Lower Saxony, and duchy of Holstein, with a strong castle, subject to Denmark. It is seated on the Elbe, near its mouth, 30 miles N. W. of Hamburg, and 55 N. of Bremen. E. lon. 9. 15. N. lat. 53. 53.

GLUE, among artificers, a tenacious viscid matter, which serves as a cement to bind or connect things together. Glues are of different kinds, according to the various uses they are designed for: as the common-glue, glove-glue, and parchment-glue; whereof the two last are more properly called *size*. The common or strong glue is chiefly used by carpenters, joiners, cabinet-makers, &c. It is made of skins of animals, as oxen, cows, calves, sheep, &c.; and the older the creature is, the better is the glue made of its hide. Whole skins, however, are but rarely used for this purpose, but only the shavings, parings, or scraps of them; or the feet, sinews, &c. That made of whole skins is undoubtedly reckoned the best; as that made of sinews is the very worst.

In making glue of parings, they first steep them two or three days in water: then, washing them well out, they boil them to the consistence of a thick jelly; which they pass while hot through ozier-baskets, to separate the impurities from it; and then let it stand some time to purify it further: when all the filth and ordures are settled to the bottom of the vessel, they melt and boil it a second time. They next pour it into flat

frames or moulds, whence it is taken out pretty hard and solid, and cut into square pieces or cakes. They afterwards dry it in the wind in a sort of coarse net, and at last firing it to finish its drying. The glue made of sinews, feet, &c. is managed after the same manner, only with this difference, that they bone and scour the feet, and do not lay them to steep.

Of this commodity there is a very great exportation from England; the English glue being universally allowed to be the best in Europe, partly from the excellency of the materials, and partly from the skill of the manufacturers. Next to this is the Flanders glue. In both countries it is made by the tanners from fragments of good skins dried with much care. In France it is a separate trade: and the glue-makers pick up their materials as they can from the several dealers in skins, and boiling these with cow-heels, make their glue; which, as they purchase every thing, must render it dear, as well as of an inferior quality. The duty on exportation is tenpence, and on importation three shillings and tenpence, on every hundred weight. The best glue is that which is made from the skin of the oldest beast, especially if a bull's hide is used. Experience likewise shows that glue is considerably improved in quality by keeping.

A glue that will hold against fire or water, it is said, may be made thus: Mix a handful of quicklime with four ounces of linseed oil; boil them to a good thickness; then spread it on tin-plates in the shade, and it will become extremely hard, but may be easily dissolved over a fire, as glue, and will effect the business for which it is intended.

Neumann observes, that glue dissolved in a solution of lapis calaminaris in spirit of nitre, and afterwards inspissated, forms an extremely slippery tenacious mass, which might be of use for entangling flies, caterpillars, and other insects, if it was not too expensive.

To prepare glue for use, it is merely required to set a quart of water on the fire, and put in about half a pound of glue, keeping them close to the fire, nearly in a boiling state, till the glue is dissolved. When glue is to be *used*, it must be made hot; after which, with a brush dipped in it, besmear the faces of the joints as quick as possible: then clapping them together, slide or rub them lengthwise one upon another, two or three times, to settle them close; and so let them stand till they are dry and firm.

GLUME, *gluma*, among botanists, a species of calyx, consisting of two or three membranous valves, which are often pellicled at the edges. This kind of calyx belongs to the grasses.

GLUT, among falconers, the slimy substance that lies in a hawk's paunch.

GLUTA, in botany; a genus of the pentandria order, belonging to the gynandria class of plants. The calyx is campanulated and deciduous; there are five petals glued below to the column of the germ; and the filaments inserted on the top of the column, on which also the germen sits.

GLUTÆUS, a name common to three muscles whose office it is to extend the thigh. See ANATOMY, *Table of the Muscles*.

GLUTTON, in zoology. See MUSTELA.

GLUTTONY, a voracity of appetite, or a propensity to gormandizing. A morbid sort of gluttony has been supposed to exist, called *fames canina*, "dog-like appetite," which sometimes occurs, and renders the person seized with it an object of cure as in other diseases. See BULIMY. But professed habitual gluttons may be reckoned amongst the monsters of nature, and for this reason king James I. was not greatly in the wrong when he asked a man who was presented to him that could eat a whole sheep at one meal, "What he could *do more than another man*?" and being answered "He could not do so much," said, "Hang him then; for it is unfit a man should

five that eats as much as twenty men, and cannot do so much as one."

The emperor Clodius Albinus would devour more apples at once than a bushel would hold. He would eat 500 figs to his breakfast, 100 peaches, 10 melons, 20 pound weight of grapes, 100 gnat snappers, and 400 oysters. "Eye upon him (saith Lipsius); God keep such a curse from the earth."

One of our Danish kings named *Hardiknute* was so great a glutton, that a historian calls him *Bacca de Porco*, "Swine's-mouth." His tables were covered four times a-day with the most costly viands that either the air, sea, or land, could furnish: and as he lived he died; for, revelling and carousing at a wedding banquet at Lambeth, he fell down dead. His death was so welcome to his subjects, that they celebrated the day with sports and pastimes, calling it *Hock-tide*, which signifies scorn and contempt. With this king ended the reign of the Danes in England. One Phagon, under the reign of the emperor Aurelianus, at one meal ate a whole boar, 100 loaves of bread, a sheep, a pig, and drank above three gallons of wine.

We are told by Fuller, that one Nicholas Wood, of Harrison in Kent, ate a whole sheep of 16s. price at one meal, raw; at another time, 30 dozen of pigeons. At Sir William Sidley's in the same county, he ate as much victuals as would have sufficed 30 men. At Lord Wotton's mansion-house in Kent, he devoured at one dinner 84 rabbits; which, by computation at half a rabbit a man, would have served 168 men. He ate to his breakfast 18 yards of black pudding. He devoured a whole hog at one sitting down; and after it, being accommodated with fruit, he ate three pecks of damsons.

A counsellor at law, whose name was Mallet, well known in the reign of Charles I. ate at one time an ordinary provided in Westminster for 30 men at twelve-pence a piece. His practice not being sufficient to supply him with better sort of meat, he fed generally on offals, ox-livers, hearts, &c. He lived to almost 60 years of age, and for the seven last years of his life ate as moderately as other men. A narrative of his life was published.

GLYCINE, KNOBBED-ROOTED LIQUORICE-VETCH; a genus of the decandria order, belonging to the diadelphia class of plants, and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is bilabiate; the carina of the corolla turning back the vexillum with its point. There is but one species commonly cultivated in our gardens, viz. the frutescens, or Carolina kidney-bean tree. This hath shrubby climbing stalks, twining round any support, 15 or 20 feet high, adorned with pinnated leaves of three pair of foliicles terminated by an odd one, and from the axillas clusters of large blueish-purple flowers, succeeded by long pods like those of the climbing kidney-bean. It flowers in June and July, but the seeds do not ripen in this country. It is easily propagated, either by seeds imported from America, where it is native, or by layers. The stalks and roots of the *abrus*, another species of glycine, which grows in Egypt and the Indies, are very sweet to the taste. Herman affirms, that the juice obtained from them by decoction is little inferior to liquorice; whence its name of *wild liquorice* in those parts of America where it is native.

GLYCIRRHIZA, LIQUORICE; a genus of the decandria order, belonging to the diadelphia class of plants, and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is bilabiate; the upper lip tripartite, and the under one entire; the legumen ovate and compressed. There are two species. 1. The *glabra*, or common liquorice, hath a long, thick, creeping root, striking several feet deep into the ground; upright, firm, herbaceous stalks annually, three or four feet high, garnished with winged leaves of four or five pair of oval lobes, terminated by an odd one; and from the axillas erect spikes of pale blue flowers in July, succeeded by short smooth

Pods. The root of this is the useful part, which is replete with a sweet, balsamic, pectoral juice, much used in all compositions for coughs and disorders of the stomach. 2. The *erbinata*, or prickly-podded liquorice, is nearly like the common sort, only the seed pods are prickly. Both these species are very hardy perennials; but the first is the sort commonly cultivated for use, its roots being fuller of juice and sweeter than the other. The roots are perennial; but the stalks rise in spring and decay in autumn.

Their *propagation* is effected by cuttings of the small roots issuing from the sides of the main ones near the surface of the earth, dividing them into lengths of six or eight inches, each having one or more good buds or eyes; and the proper season for procuring the sets for planting is any time in open weather from October till March, though from the middle of February till the middle of March is rather the most successful season for planting. An open situation is the most suitable for a plantation of these plants. Particular regard should also be had to the soil: it ought to be of a light loose composition, and three or four feet deep if possible; for the roots of the liquorice will arrive at that depth and more, and the longer the roots the more valuable they are for sale by weight.

Having fixed on the ground, let it be trenched three spades deep, if the depth of proper soil will admit; then having your sets ready, proceed to plant them by line and dibble, planting the sets a foot distance in each row; putting them perpendicular into the ground, with the tops about an inch under the surface; and let the rows be a foot and a half asunder; though the London gardeners seldom allow more than twelve inches between row and row. These gardeners also sow a crop of onions on the same ground the first year; which, as the onions' root but slender, and spread but little at top, may be done without any detriment to the liquorice, or to the onions, as it does not rise above ten or twelve inches high the first summer; observing to keep the ground clean from weeds during that season by hoeing. If there is a crop of onions, use the small hoe, cutting out the onions to four or five inches distance, clearing away such as grow immediately close to the liquorice plants; and when the onions are gathered, give the ground a thorough hoeing with a large hoe, to loosen the surface and destroy all weeds effectually; and in autumn cut down the decayed stalks of the liquorice, and nothing more is necessary to be done till spring; when, in February or March, give a slight digging between the rows; during spring and summer, keep down all weeds by broad-hoeing; and in autumn, when the stalks are in a decaying state, cut them down to the surface of the earth.

In three years after planting, the roots of the liquorice will be fit to take up: and the proper season for this is, any time from the beginning of November till February; for it should neither be taken up before the stalks are fully decayed, nor deferred till late in spring, otherwise the roots will be apt to shrivel and diminish in weight. In taking them up, the small side-roots are trimmed off, and the best divided into lengths for fresh sets, and the main roots are tied in bundles ready for sale. It is of advantage to sell them as soon as possible after they are taken up, before they lose much of their weight. They are sold to the druggists from about twenty to thirty or forty shillings per hundred weight; and an acre of ground has produced three thousand and upwards, which has been sold for more than sixty pounds; but the price is commonly in proportion to the goodness of the roots.

Although the common liquorice is cultivated in most countries of Europe for the sake of its root, yet that which is produced in Britain is preferable to such as comes from abroad; this last being generally mouldy, which this root is very apt to become, unless kept in a dry place. The powder of liquorice usually sold is often mingled with flour, and probably too often with

substances not quite so wholesome : the best sort is of a brownish yellow colour (the fine pale yellow being generally sophisticated), and of a very rich sweet taste, much more agreeable than that of the fresh root. Liquorice is almost the only sweet that quenches thirst ; whence it was called by the Greeks *adipson*. Galen takes notice, that it was employed in this intention in hydropic cases, to prevent the necessity of drinking. Mr. Fuller, in his *Medicina Gymnastica*, recommends this root as a very useful pectoral ; an assertion warranted by experience. An extract is directed to be made from it in the shops ; yet this preparation is chiefly brought from abroad, though the foreign extract is not the best.

GLYPH, in sculpture and architecture, denotes any canal or cavity used as an ornament.

GMELIN (Dr. Samuel), professor at Tubingen, and afterwards member of the Imperial Academy of Sciences at St. Petersburg, commenced his travels in June 1768 ; and having traversed the provinces of Moscow, Voronetz, New Russia, Azof, Casan, and Astracan, he visited in 1770 and 1771 the different harbours of the Caspian, and examined with peculiar attention those parts of the Persian provinces which border upon that sea, of which he has given a circumstantial account in the three volumes of his travels already published. Actuated by a zeal for extending his observations, he attempted to pass through the western provinces of Persia, which are in a perpetual state of warfare, and infested by numerous banditti. Upon this expedition he quitted in April 1772 Einzillee, a small trading place in Ghilan, upon the southern shore of the Caspian ; and, on account of many difficulties and dangers, did not until December 2, 1773, reach Sallian, a town situated upon the mouth of the river Koor. Thence he proceeded to Baku and Kuba in the province of Shirvan, where he met with a friendly reception from Ali Feth Khan, the sovereign of that district. After he had been joined by 20 Uralian Cossacks, and when he was only four days journey from the Russian fortress Kislar, he and his companions were, on the 5th of February 1774, arrested by order of Usmei Khan, a petty Tartar prince, through whose territories he was obliged to pass. Usmei urged, as a pretence for this arrest, that 30 years ago several families had escaped from his dominions, and had found an asylum in the Russian territories ; adding, that Gmelin should not be released until these families were restored. The professor was removed from prison to prison ; and at length, wearied out with continual persecutions, he expired July 27th, at Achmet-Kent, a village of Mount Caucassus. His death was occasioned partly by vexation for the loss of several papers and collections, and partly by disorders contracted from the fatigues of his long journey. Some of his papers had been sent to Kislar during his imprisonment, and the others were not without great difficulty rescued from the hands of the barbarian who had detained him in captivity. The arrangement of these papers, which form a fourth volume of his travels, was at first consigned to the care of Guldenslaedt, but upon his death the task was transferred to the learned Pallas.

GMELINA, in botany ; a genus of the angiospermia order, belonging to the didynamia class of plants, and in the natural method ranking under the 40th order, *Personatæ*. The calyx is nearly quadridentated ; the corolla campanulated or bell-shaped ; there are two bipartite and two simple antheræ ; the fruit is a plum with a bilocular kernel.

GNAPHALIUM, CUDWEED, GOLDY LOCKS, ETERNAL FLOWER, &c. ; a genus of the polygamia superflua order, belonging to the syngenesia class of plants, and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked ; the pappus feathered ; the calyx imbricated, with the marginal scales roundish, parched, and coloured. There are 41 species ; the most remarkable of which are,

1. The *margaritaceum*, or pearly-white eternal flower, hath creeping, very spreading roots, crowned with broad, spear-shaped, white, hoary leaves ; herbaceous, thick, woolly stalks, a foot and a half high, branching outward, garnished with long, acute-pointed, white, woolly leaves, and terminated by a corymbose cluster of yellowish flowers, which appear in June and July, and are very ornamental. 2. The *plantaginifolium*, hath large woolly radical leaves, decumbent running roots, and herbaceous simple stalks, rising six or eight inches high, terminated by a corymbus of white flowers in June, July, &c. 3. The *steechas*, hath a shrubby stalk, dividing into slender branches three feet long, terminated by corymbose clusters of yellow flowers, appearing in May and June. 4. The *orientale*, or oriental goldy locks, hath three varieties, with yellow, gold-coloured, and white silvery flowers. They have shrubby stalks, rising two or three feet high. 5. The *odoratissimum*, or sweet-scented eternal flower, hath shrubby winged stalks, branching irregularly a yard high, with corymbose clusters of bright yellow flowers, changing to a dark yellow. 6. The *arborescens*, or tree gnaphalium, hath a woody stem, branching four or five feet high, narrow sessile leaves, with revolute borders, smooth on their upper side, and roundish bunches of pale yellow flowers. The first three sorts are hardy, and will thrive in any soil or situation. The two first increase exceedingly by their roots ; and the third is easily propagated by slips. The fourth, fifth, and sixth sorts are somewhat tender, and therefore should be kept in pots, to be sheltered in a green-house or garden frame in winter. Others may be planted in the full ground, in a dry and warm situation, especially the oriental kind and varieties, and likewise the sweet-scented kind ; for these two species will struggle tolerably through an ordinary winter, and make a pretty appearance during the summer months. All these are propagated by slips or cuttings of their shoots. The flowers of all these species are remarkable for retaining their beauty for years, if carefully gathered in a dry day, soon after they are blown.

GNAT, in zoology. See CULEX.

GNESNA, a large and strong town of Great Poland, of which it is capital, and in the palatinate of Calish, with an archbishop's see, whose prelate is primate of Poland, and viceroy during the vacancy of the throne. It was the first town built in the kingdom, and formerly more considerable than at present. E. lon. 18. 20. N. lat. 52. 28.

GNETUM, in botany ; a genus of the monadelphia order, belonging to the monœcia class of plants. The amentum of the male is a single scale ; there is no corolla, and but one filament with a pair of antheræ. The calyx of the female is of the same form ; there is no corolla ; the style with the stigma is trifid ; the fruit a monospermous plum.

GNIDIA, in botany ; a genus of the monogynia order, belonging to the octandria class of plants. The calyx is funnel-shaped and quadrifid, with four petals inserted into it : there is one seed somewhat resembling a berry.

GNOMES, GNOMI, certain imaginary beings who, according to the cabbalists, inhabit the inner parts of the earth. They are supposed small in stature, and the guardians of quarries, mines, &c. See FAIRY.

GNOMON, in dialling, the style, pin, or cock of a dial, which by its shadow shows the hour of the day. The gnomon of every dial represents the axis of the world (See DIAL and DIALLING). The word is Greek, *γνομων*, which literally implies something that makes a thing known ; by reason that the style or pin indicates or makes the hour known.

GNOMON, in astronomy, a style erected perpendicular to the horizon, in order to find the altitude of the sun. Thus in the right-angled triangle ABC (pl. 91. Vol. II.), are given, AB the length of the style, BC the length of its shadow, and the right angle ABC. Hence, making CB the radius, we have this ana-

logy for finding the angle ACB, the sun's altitude, viz. BC : AB : : radius : tangent of the angle C. By means of a gnomon, the sun's meridian altitude, and consequently the latitude of the place, may be found more exactly than with the smaller quadrants. See QUADRANT. By the same instrument the height of any object GH may be found; for as DE, the distance of the observer's eye from the gnomon, is to DE, the height of the style; so is FH, the distance of the observer's eye from the object, to GH, its height. See further on the uses and application of Gnomons, the article GEOGRAPHY, page 734.

GNOMON of a *Globe*; the index of the hour circle.

GNOMONICS, the art of dialling. See DIALLING.

GNOSTICS, ancient heretics, famous from the first rise of Christianity, principally in the east. It appears from several passages of the sacred writings, particularly 1 John ii. 18. 1 Tim. vi. 20. and Col. ii. 8. that many persons were infected with the gnostic heresy in the first century; though the sect did not render itself conspicuous, either for number or reputation, before the time of Adrian, when some writers erroneously date its rise. The name is formed of the Latin *gnosticus*, and that of the Greek γνωσις "knowing," of γινωσκω "I know;" and was adopted by those of this sect, as if they were the only persons who had the true knowledge of Christianity. Accordingly, they looked on all other Christians as simple, ignorant, and barbarous persons, who explained and interpreted the sacred writings in a too low, literal, and unedifying signification. At first the Gnostics were only the philosophers and wits of those times, who formed for themselves a peculiar system of theology, agreeable to the philosophy of Pythagoras and Plato; to which they accommodated all their interpretations of scripture. But

GNOSTICS afterwards became a generical name, comprehending many sects and parties of heretics, who rose in the first centuries, and who, though they differed among themselves as to circumstances, yet all agreed in some common principles. They were such as corrupted the doctrine of the gospel by a profane mixture of the tenets of the oriental philosophy, concerning the origin of evil and the creation of the world, with its divine truths. Such were the Valentinians, Simonians, Carpocratians, Nicolaitans, &c.

GNOSTICS was sometimes also more particularly attributed to the successors of the first Nicolaitans and Carpocratians, in the second century, upon their laying aside the names of the first authors. Such as would be thoroughly acquainted with all their doctrines, reveries, and visions, may consult St. Irenæus, Tertullian, Clemens Alexandrinus, Origen, and St. Epiphanius; particularly the first of these writers, who relates their sentiments at large, and confutes them at the same time: indeed he dwells more expressly on the Valentinians than any other sort of Gnostics; but he shows the general principles whereon all their mistaken opinions were founded, and the method they followed in explaining scripture. He accuses them with introducing into religion certain vain and ridiculous genealogies, i. e. a kind of divine processions or emanations, which had no other foundation but in their own wild imaginations.

In effect, the Gnostics confessed that these æons or emanations were no where expressly delivered in the sacred writings, but insisted, at the same time, that Jesus Christ had intimated them in parables to such as could understand him. They built their theology not only on the gospels and the epistles of St. Paul; but also on the law of Moses and the prophets. These last laws were peculiarly serviceable to them, on account of the allegories and allusions with which they abound which are capable of different interpretations: Though their doctrine, concerning the creation of the world by one or more inferior beings of an evil or imperfect nature, led them to deny the divine authority of the books of the Old Testament, which contradicted

this idle fiction, and filled them with an abhorrence of Moses and the religion he taught: alleging, that he was actuated by the malignant author of this world, who consulted his own glory and authority, and not the real advantage of men. Their persuasion that evil resided in matter as its centre and source made them treat the body with contempt, discourage marriage, and reject the doctrine of the resurrection of the body and its reunion with the immortal spirit. Their notion, that malevolent genii presided in nature, and occasioned diseases and calamities, wars, and desolations, induced them to apply themselves to the study of magic, in order to weaken the powers or suspend the influence of their malignant agents.

The Gnostics considered Jesus Christ as the Son of God, and consequently inferior to the Father, who came into the world for the rescue and happiness of miserable mortals, oppressed by matter and evil beings: but they rejected our Lord's humanity, on the principle that every thing corporeal is essentially and intrinsically evil; and therefore the greatest part of them denied the reality of his sufferings. They set a great value on the beginning of the gospel of St. John, where they fancied they saw a great deal of their æons or emanations under the *Word*, the *Life*, the *Light*, &c. They divided all nature into three kinds of beings, viz. *hylic*, or material; *psychic*, or animal; and *pneumatic*, or spiritual. On the like principle they also distinguished three sorts of men; *material*, *animal*, and *spiritual*. The first, who were material and incapable of knowledge, inevitably perished, both soul and body: the third, such as the Gnostics themselves pretended to be, were all certainly saved: the psychic, or animal, who were the middle between the other two, were capable either of being saved or damned, according to their good or evil actions.

With regard to their moral doctrines and conduct, they were much divided. The greatest part of this sect adopted very austere rules of life, recommended rigorous abstinence, and prescribed severe bodily mortifications, with a view of purifying and exalting the mind. However, some maintained that there was no moral difference in human actions; and thus, confounding right with wrong, they gave a loose rein to all the passions, and asserted the innocence of following blindly all their notions, and of living by their tumultuous dictates. They supported their opinions and practice by various authorities: some referred to fictitious and apocryphal writings of Adam, Abraham, Zoroaster, Christ, and his apostles; others boasted that they had deduced their sentiments from secret doctrines of Christ, concealed from the vulgar; others affirmed that they arrived at superior degrees of wisdom by an innate vigour of mind; and others asserted that they were instructed in these mysterious parts of theological science by Theudas, a disciple of St. Paul, and by Matthias, one of the friends of our Lord. The tenets of the ancient Gnostics were revived in Spain, in the fourth century, by a sect called the *Priscillianists*.

The appellation *Gnostic* sometimes also occurs in a good sense in the ancient ecclesiastical writers, and particularly Clemens Alexandrinus, who, in the person of his Gnostic, describes the characters and qualities of a perfect Christian. This point he labours in the seventh book of his *Stromata*, where he shows that none but the Gnostic, or learned person, has any true religion. He affirms, that were it possible for the knowledge of God to be separated from eternal salvation, the Gnostic would make no scruple to choose the knowledge; and that if God would promise him impunity in doing of any thing he has once spoken against, or offer him heaven on those terms, he would never alter a whit of his measures. In this sense the father uses Gnostics in opposition to the heretics of the same name, affirming, that the true Gnostic is grown old in the study of the holy scripture, and that he preserves the orthodox doctrine of the apostles and of the church; whereas the false Gnostic

abandons all the apostolical traditions, as imagining himself wiser than the apostles. At length the name *Gnostic*, which originally was the most glorious, became infamous, by the idle opinions and dissolute lives of the persons who bore it.

GNU, or GNOU, in zoology. See CAPRA.

GOA, a considerable city of the peninsula of Hindoostan, on the coast of Malabar; the capital of the Portuguese settlements in India, and the seat of a viceroy. It was first taken by Albuquerque in 1510 from a prince of Saracen extraction. It stands in an island about 22 miles in length, and six in breadth, and is built on the N. side of it, having the conveniency of a fine river, capable of receiving ships of the greatest burden, where they lie within a mile of the town. The banks of the river are beautified with a great number of handsome structures, such as churches, castles, and gentlemen's houses. The air within the town is unwholesome, for which reason it is not so well inhabited now as it was formerly. The viceroy's palace is a noble building, and stands at a small distance from the river, over one of the gates of the city, which leads to a spacious street, terminated by a beautiful church. This city contains a great number of handsome churches and convents, with a stately hospital. The market-place takes up an acre of ground; and in the shops about it may be had the produce of Europe, China, Bengal, and other countries. Their religion is the Roman Catholic, and they have a severe inquisition. The clergy are numerous and illiterate: the churches are finely embellished, and have a great number of images. Their houses are large, and make a fine appearance, but are poorly furnished. The inhabitants are contented with greens, fruits, and roots, which, with a little bread, rice, and fish, is their principal diet, though they have hogs and fowls in plenty. It is remarkable, that only one of the churches has glass windows; for they make use of clear oyster-shells instead of glass, and all their fine houses have the same. Goa has few manufactures or productions, their best trade being in arrack, which they distil from the sap of the cocoa nut-tree. The harbour is defended by several forts and batteries. Goa is 292 miles S. by E. of Bombay. Lon. 72. 45. E. Lat. 15. 28. N.

GOAL. See GAOL.

GOAT, in zoology. See CAPRA.

GOAT'S-Beard, in botany. See TRAGOPOGON.

GOAT-Sucker, in ornithology. See CAPRIMULGUS.

GOBBO (Pietro Paolo Cortonese, so called), a celebrated painter of fruit and landscapes, was born at Cortona in 1580, and learned the principles of design from his father; but was afterwards the disciple of one Crescenzio at Rome, and perfected himself in the most essential parts of his profession, by studying after nature, with judgment and accuracy. His merit soon recommended him to the notice and esteem of the most able judges at Rome; and as he excelled equally in painting fruit and landscape, he found a generous patron in cardinal Borghese, who employed him to adorn his palace. The fruit which he painted had so true and expressive an imitation of nature, that nothing could possibly be more exact; and by his thorough knowledge of the chiaro-scuro, he gave an extraordinary roundness and relief to every object. But his greatest excellence consisted in his colouring; for in design he was not remarkably superior to others. He died in 1640.

GOBELIN (Giles), a famous French dyer, in the reign of Francis I. discovered a method of dyeing a beautiful scarlet, and his name has been given ever since to the finest French scarlets. His house, in the suburb of St. Marcel at Paris, and the river he made use of, are still called *the Gobelins*. An academy for drawing, and a manufactory of fine tapestries, were erected in this quarter in 1666; for which reason the tapestries are called *the Gobelins*.

GOBIUS, in ichthyology, a genus of fishes belonging to the

order of thoracici. They have two holes between the eyes, four rays in the membrane of the gills, and the belly fins are united in an oval form. There are eight species, principally distinguished by the number of rays in their fins.

GOBLET, or GOBLET, a kind of drinking cup or bowl, ordinarily of a round figure, and without either foot or handle. The word is French, *goblet*; which Salmasius and others derive from the barbarous Latin *cupa*. Budeus deduces it from the Greek *κυπελλον*, a sort of cup.

GOD, one of the many names of the Supreme Being. See CHRISTIANITY, METAPHYSICS, MORAL PHILOSOPHY, and THEOLOGY.

GOD is also used in speaking of the false deities of the heathens, many of which were only creatures to which divine honours and worship were superstitiously paid. The Greeks and Latins, it is observable, did not mean by the name of *God* an all-perfect being, whereof eternity, infinity, omnipresence, &c. were essential attributes: with them, the word only implied an excellent and superior nature, and accordingly they give the appellation *gods* to all beings of a rank or class higher or more perfect than that of men, and especially to those who were inferior agents in the divine administration, all subject to the one Supreme. Thus men themselves, according to their system, might become gods after death; inasmuch as their souls might attain to a degree of excellence superior to what they were capable of in life.

The first divines, father Bossu observes, were the poets: the two functions, though now separated, were originally combined; or, rather, were one and the same thing. Now the great variety of attributes in God, that is, the number of relations, capacities, and circumstances, wherein they had occasion to consider him, put these poets, &c. under a necessity of making a partition, and of separating the divine attributes into several persons; because the weakness of the human mind could not conceive so much power and action in the simplicity of one single divine nature. Thus the omnipotence of God came to be represented under the person and appellation of Jupiter; the wisdom of God, under that of Minerva; the justice of God, under that of Juno. The first idols or false gods that are said to have been adored were the stars, sun, moon, &c. on account of the light, heat, and other benefits, which we derive from them. Afterwards the earth came to be deified, for furnishing fruits necessary for the subsistence of men and animals; then fire and water became objects of divine worship, for their usefulness to human life. In process of time, and by degrees, gods became multiplied to infinity; and there was scarce any thing but the weakness or caprice of some devotee or other elevated into the rank of deity; things useless or even destructive not excepted. See MYTHOLOGY.

GODALMING, a town of Surry, with a market on Saturday. It is seated on the river Wey, where it divides into several streams. It is four miles S. W. of Guildford, and 34 S. W. of London. Lon. 0. 34. W. Lat. 51. 13. N.

GODAVERY, or GONDA GODOWRY, a river of the Decan of Hindoostan, which has its source about 90 miles to the N. E. of Bombay; and, in the upper part of its course at least, is esteemed a sacred river by the Hindoos; that is, ablutions performed in its stream have a religious efficacy superior to those performed in ordinary streams. After crossing Dowlatabad and Golconda, from W. to E. it turns to the S. E. and receiving the Bain Gonga about 90 miles above the sea, divides into two principal channels at Rajamundry; and these subdividing again, form all together several tide harbours for vessels of moderate burden. Ingeram, Coringa, Yalam, Bandarmalanka, and Narasapour, are among the places situated at the mouth of this river, which appears to be the most considerable one between the Ganges and Cape Comorin. Extensive forests of teak

timber border on its banks, within the mountains, and supply ship timber for the use of the above mentioned ports. The word *Gonga* is the Indian name of a river.

GODDARD (Jonathan), an eminent physician and chemist, and one of the first promoters of the Royal Society, was born about the year 1617. He was elected a fellow of the college of physicians in 1646, and appointed reader of the anatomical lecture in that college in 1647. As he took part against Charles I. accepted the wardenship of Merton-college, Oxford, from Oliver Cromwell when chancellor, and sat sole representative of that university in Cromwell's parliament, he was removed from his wardenship in a manner disgraceful to him by Charles II. He was however then professor of physic at Gresham college, to which he retired, and continued to attend those meetings that gave birth to the Royal Society; upon the first establishment of which, he was nominated one of the council. Being fully persuaded that the preparation of medicines was no less the physician's duty than the prescribing them, he constantly prepared his own; and in 1668 published a treatise recommending his example to general practice. He died of an apoplectic fit in 1674; and his memory was preserved by the drops that bore his name, otherwise called *Gutta Anglicana*, the secret of which he sold to Charles II. for 5000*l.* and which Dr. Lister assures us was only the volatile spirit of raw silk rectified with oil of cinnamon or some other essential oil. But he claims more particular regard, if what bishop Seth Ward says be true, that he was the first Englishman who made that noble astronomical instrument, the telescope.

GODDESS, a heathen deity of the female sex. The ancients had almost as many goddesses as gods: such were, Juno the goddess of air, Diana the goddess of woods, &c. and under this character were represented the virtues, graces, and principal advantages of life; truth, justice, piety, liberty, fortune, victory, &c. It was the peculiar privilege of the goddesses to be represented naked on medals; for it was supposed that the imagination must be awed and restrained by the consideration of the divine character.

GODEAU (Anthony), bishop of Grasse and Vence in France, was born at Dreux in 1605. He was a very voluminous writer, both in prose and verse; but his principal works are, 1. *An ecclesiastical history*, 3 vols. folio, containing the first eight centuries only, as he never finished more. 2. *Translation of the Psalms into French verse*; which was so well approved, that even those of the reformed religion preferred it to that of Marat. He died in 1671.

GODFATHERS and **GODMOTHERS**, persons who, at the baptism of infants, answer for their future conduct, and solemnly promise that they will renounce the devil and all his works, and follow a life of piety and virtue; and by this means lay themselves under an indispensable obligation to instruct them, and watch over their conduct. This custom is of great antiquity in the Christian church, and was probably instituted to prevent children being brought up in idolatry, in case their parents died before they arrived at years of discretion. The number of godfathers and godmothers is reduced to two in the church of Rome; and three in the church of England; but formerly they had as many as they pleased.

GODFREY (of Bouillon), prince of Lorraine, a most celebrated crusader and victorious general. He was chosen general of the expedition which the Christians undertook for the recovery of the Holy Land, and sold his dukedom to prepare for the war. He took Jerusalem from the Turks in 1099; but his piety, as historians relate, would not permit him to wear a diadem of gold in the city where his Saviour had been crowned with thorns. The sultan of Egypt afterwards sent a terrible army against him; which he defeated, with the slaughter of about 100,000 of the enemy. He died in 1160.

VOL. IV.

GODMANCHESTER, a town of Huntingdonshire, parted from Huntingdon by the river Ouse. It was incorporated by James I. and is seated in a rich and fertile soil, which yields great plenty of corn. It is inhabited by a great number of yeomen and farmers, who are said to have very extraordinary teams of horses.

GODOLPHIN (John), an eminent English civilian, was born in the island of Scilly in 1617, and educated at Oxford. In 1642-3 he was created doctor of civil law; in 1653 he was appointed one of the judges of the admiralty; and at the Restoration, he was made one of his majesty's advocates. He was esteemed as great a master of divinity as of his own faculty, and published, 1. *The holy limbeck*. 2. *The holy harbour*. 3. *A view of the admiral's jurisdiction*. 4. *The orphan's legacy*. 5. *Reperitorium canonicum*, &c. He died in 1678.

GODSTOW, a place northwest of Oxford, in a sort of island formed by the divided streams of the Isis after being joined by the Evenlode. It is noted for fish and their excellent manner of dressing them; but more so for the ruins of that nunnery which fair Rosamond quitted for the embraces of Henry II. The people show a great hole in the earth here, where they say is a subterraneous passage, which goes under the river to Woodstock, by which she used to pass and repass. Little more remains at present than ragged walls, scattered over a considerable extent of ground. An arched gateway, and another venerable ruin, part of the tower of the conventual church, are still standing. Near the altar in this church fair Rosamond was buried; but the body was afterwards removed by order of a bishop of Lincoln, the visitor. The only entire part is small, formerly a private chapel. Not many years since a stone coffin, said to have been Rosamond's, who perhaps was removed from the church to this place, was to be seen here. The building has been put to various uses, and at present serves occasionally for a stable.

GODWIN (Francis), successively bishop of Landaff and Hereford, was born in 1567. He was eminent for his learning and abilities, being a good mathematician, an excellent philosopher, a pure Latinist, and an accurate historian. He understood the true theory of the moon's motion, a century before it was generally known. He first started those hints, afterwards pursued by bishop Wilkins, in his "Secret and swift messenger;" and published "A catalogue of the lives of English bishops." He has nevertheless been represented as a great simoniac, for omitting no opportunity of disposing of preferments in order to provide for his children. He died in 1648.

GODWIN (Thomas), a learned English writer born in 1517, was master of the free-school at Abington in Berkshire; where he educated a great many youths who became eminent both in church and state. His works show him to have been a man of great learning: such as, *Historia Romanæ anthologia*, *Synopsis antiquitatum Hebraicarum*, *Moses & Aaron*, *Florilegium Phrasicon*, &c. He died in 1642.

GODWIN, or *Goodwin Sands*. See **GOODWIN-SANDS**.

GODWIT, in ornithology. See **SCOLOPAX**.

GOES, or **TER GOES**, a strong and considerable town of the United Provinces in Zealand, and capital of the island of South Beveland. It communicates with the sea by a canal, and is 10 miles east of Middleburg, and 30 north of Ghent. E. lon. 3. 50. N. lat. 51. 33.

GOG and **MAGOG**, two names generally joined together in scripture (Ezek. xxxviii. 2, 3, &c. xxxix. 1, 2, &c. Rev. xx. 8.). Moses speaks of Magog the son of Japhet, but says nothing of Gog, (Gen. x. 2. 1. Chr. i. 5.). Gog was prince of Magog, according to Ezekiel. Magog signifies the country or people, and Gog the king of that country. The generality of the ancients made Magog the father of the Scythians and Tartars; and several interpreters discovered many footsteps of their

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name in the provinces of Great Tartary. Others have been of opinion that the Persians were the descendants of Magog; and some have imagined that the Goths were descended from Gog and Magog; and that the wars described by Ezekiel, and undertaken by Gog against the saints, are no other than those which the Goths carried on in the fifth age against the Roman empire.

Bochart has placed Gog in the neighbourhood of Caucasus. He derives the name of this celebrated mountain from the Hebrew *Gog-chazim*, "the fortress of Gog." He maintains that Prometheus, said to be chained to Caucasus by Jupiter, is Gog, and no other. There is a province in Iberia called the Gogarene. Lastly, the generality believe that Gog and Magog, mentioned in Ezekiel and the Revelations, are to be taken in an allegorical sense, for such princes as were enemies to the church and saints. Thus many by Gog in Ezekiel understand Antiochus Epiphanes, the persecutor of those Jews who were firm to their religion; and by the person of the same name in the Revelations, they suppose Antichrist to be meant; the great enemy of the church and faithful. Some have endeavoured to prove that Gog, spoken of in Ezekiel, and Cambyſes king of Persia, were one and the same person; and that Gog and Magog, in the Revelations, denote all the enemies of the church, who should be persecutors of it to the consummation of ages.

GOGGLES, in surgery, are instruments used for curing squinting, or that distortion of the eyes which occasions this disorder. They are short conical tubes, composed of ivory stained black, with a thin plate of the same ivory fixed in the tubes near their anterior extremities. Through the centre of each of these plates is a small circular hole, about the size of the pupil of the eye, for the transmission of the rays of light. These goggles must be continually worn in the day-time, till the muscles of the eye are brought to act regularly and uniformly, so as to direct the pupil straight forward; and by these means the cure will be sooner or later effected.

GOGMAGOG-HILLS, are hills so called, three miles from Cambridge, remarkable for the intrenchments and other works cast up here: whence some suppose it was a Roman camp; and others, that it was the work of the Danes.

GOGUET (Antony-Yves), a French writer, and author of a celebrated work, intitled, *L'Origine des Loix, des Arts, des Sciences, & de leur Progres chez les anciens Peuples*, 1758, 3 vols. 4to. His father was an advocate, and he was born at Paris in 1716. He was very unpromising as to abilities, and reckoned even dull in his early years; but his understanding developing itself, he applied to letters, and at length produced the above work. The reputation he gained by it was great: but he enjoyed it a very short time; dying the same year of the small-pox, which disorder it seems he always dreaded. It is remarkable that Conrad Fugere, to whom he left his library and MSS. was so deeply affected with the death of his friend, as to die himself three days after him. The above work has been translated into English, and published in 3 vols. 8vo.

GOITO, a town of Italy, in the duchy of Mantua, taken by the Germans in 1701, and by the prince of Hesse in 1706. It is seated on the river Mincio, between the lake of Mantua and that of Garda, 10 miles north-west of Mantua. E. lon. 11. 0. N. lat. 45. 16.

GOLCONDA, a country of the Decan of Hindoostan, situated between the lower parts of the rivers Kistna and Godavary, and the principal part of Dowlatabad. It was formerly called Tellingana, or Tilling, and is now subject to the Nizam of the Decan. It abounds in corn, rice, and cattle; but it is most remarkable for its diamond mines, the most considerable in the world. The black merchants buy parcels of ground to search for these precious stones in. They sometimes fail in

meeting with any, and in others they find immense riches. They have also mines of salt, fine iron for sword-blades, and curious calicoes and chintzes. Hyderabad is the capital.

GOLCONDA, a celebrated fortress in the country of the same name, situated about six miles W. N. W. of Hyderabad, and joined to that city by a wall of communication. It occupies the summit of a hill of a conical form, and is deemed impregnable. When Aurangzebe conquered the kingdom of Golconda in 1737, this fortress was taken possession of by treachery.

GOLD, the most valuable of all the metals, is of a bright yellow colour when pure, but becomes more or less changed in proportion as it is alloyed with other metals. It is the heaviest of all known bodies, platina only excepted; its specific gravity being to that of distilled water as 19.640 to 1000. It melts in a low white heat, requiring, according to Mr. Wedgwood's calculation, 5237 degrees of Fahrenheit's, or 32 of his own thermometer for its fusion; a heat greatly superior to that which melts silver or copper, the former requiring only 4717, and the latter 4587 of Fahrenheit. Other metallurgists, however, have differed, and assert that copper requires for its fusion a greater degree of heat than either gold or silver.

Gold is by far the most tough and ductile, as well as the most malleable, of all metals. According to Cronstedt, one grain of it may be stretched out so as to cover 98 Swedish ells, equal to 63.66 English yards of silver wire; but Wallerius asserts, that a grain of gold may be stretched in such a manner as to cover 500 ells of wire. At any rate the extension is prodigious; for, according to the least of these calculations, the millionth part of a grain of gold may be made visible to the naked eye. Nor is its malleability inferior to its ductility. Boyle, quoted by Apligny in his Treatise of Colours, says that one grain and an half of gold may be beaten into 50 leaves of one inch square, which, if intersected by parallel lines, drawn at right angles to each other, and distant only the 100th part of an inch from each other, will produce 25 millions of little squares, each very easily discernible by the naked eye. Mr. Magellan tells us, that its surface may be extended by the hammer 159,092 times. "I am informed (says he) by an intelligent gold-beater in England, that the finest gold leaf is that made in new skins, and must have an alloy of three grains of copper to the ounce troy of pure gold, or else it would be too soft to pass over the irregularities of the skins. He affirms that 80 books, or 2000 leaves of gold, each measuring 3.3 square inches, viz. each leaf containing 10.89 square inches, weigh less than 384 grains. Each book, therefore, or 25 leaves, = 272.23 inches, weighs less than 4.8 grains; so that each grain of the metal will produce 56.718 square inches." From further calculations it may be made to appear, that the thickness of these leaves is less than $\frac{1}{21,202,600}$ th of an inch; and that 16 ounces of gold would be sufficient to gild a silver wire equal to the whole circumference of the globe.

Gold is more elastic than lead or tin, but less so than iron or even copper. It grows hard and brittle by hammering, but resumes its ductility on being slowly heated. Gold leaf exhibits a fine green colour on being interposed between the eye and the beams of the sun or any other luminous body. When exposed for some time to a strong heat it becomes ignited, and at last melts, assuming at the same time a fine bluish-green colour; and, when cold, crystallizes into quadrilateral pyramids. This bluish-green colour, according to Mr. Magellan, as well as the former, when a thin film of the metal is interposed betwixt the eye and the luminous body, is owing to transmitted light. "The green light (says he) is transmitted in both cases, since all reflected colours are produced by the transmission of light; as the ingenious philosopher Mr. Delaval has lately discovered and

demonstrated, in his very elaborate treatise on this subject inserted in the second volume of the memoirs published in 1785 by the Philosophical Society of Manchester." Sir Isaac Newton, in his *Optics* (page 162, edition of 1730), accounts for that phenomenon, saying, that "gold foliated, and held between the eyes and the light, looks of a greenish blue; and therefore (says he) mostly gold lets into its body the blue rays, to be reflected to and fro within it, till they be stopped and stifled; while it reflects the yellow outwards, and therefore looks yellow." It is therefore in the two above cases that some of the blue rays are transmitted along with the yellow ones, and both together appear of a bluish green. If gold be exposed to the joined rays of light, excepting only the yellow ones, which we suppose stopped after they were separated by a prism, it only looks white like silver; "which shows (says Sir Isaac Newton) that its yellowness arises from the excess of intercepted rays, tinging that whiteness with their colour when they are let to pass. It is a pleasing observation to look with a deep magnifier on various pieces of gold, silver, and Dutch (copper) leaves between the eye and the sunshine. The particles of silver are seen in the form of oblong dark lumps, with some interstices, like net-work, between them: those of the copper leaf are more numerous and more regularly distributed; but the particles of the gold-leaf appear like little green semitransparent and similar particles, uniting between themselves by nearly diaphanous joints, as if they were forced to flatten in their edges, rather than they would break their mutual cohesion with one another."

Gold is more generally found native than any other metal; though Bergman informs us, that he does not know an instance of its ever being found perfectly free of alloy. Kirwan says it is seldom found so, being generally alloyed with silver, copper, or iron, and sometimes with all the three. According to Wallerius, native gold is found, 1. In solid masses in Hungary, Transylvania, and Peru. 2. In grains in the Spanish West Indies. 3. In a vegetable form like the branches or twigs of plants. 4. In a *druse* figure, as if composed of groupes or clusters of small particles united together, found in Hungary. 5. Composed of thin plates, or thin pellicles, covering other bodies, found in Siberia. 6. In a crystalline form in Hungary.

The same author informs us that gold, in its reguline state, is formed either into angular crystals, composed of yellow octaedrons, or into yellow irregular masses, which show a grain-like texture. Brunnich says that the native gold found in leaves is always crystallized on the surface, and with a magnifier they may be seen of a triangular pyramidal form. He informs us also, that in Transylvania he procured a specimen of cubic native gold, but never saw it any where else.

Gold is also found in the form of thick solid pieces. It is in general more frequently imbedded in quartz, and mixed with it, than with any other stone; and the quartz in which the gold is found in the Hungarian mines, Mr. Magellan tells us, is of a peculiar mild appearance. Sometimes, however, it is found in limestone or in hornblende, &c.

Europe is principally supplied with gold from Chili and Peru in South America. A small quantity is likewise imported from China and the coast of Africa. The principal gold mines of Europe are those of Hungary, and next to them the mines of Saltzberg. The mines of Adelfors in Smoland are likewise worked to advantage, and the veins of metal appear to be diffused over a great tract of land. Some gold, from four to seven grains in the mark, is also said to be extracted from the silver of the mines of Osterfilvarberget in the province of Dalarna. Native gold has also been found in Lapland above Tornea, and in Westmanland. In Peru it is found mixed with a stony matter, not well known, from which it is extracted by amalgamation. Mr. Pallas mentions three gold mines that are worked there

near the river Pyschma, in which 500 men are employed. The metal is found in a powdery form, and also in thin plates or leaves. Sometimes kernels or lumps of a spongy texture, and very light, are met with which contain a good quantity of gold-dust. This gold-dust or wash gold is usually washed out of sands, wherein it lies in the form of loose grains or lumps. It is distinguished by the variously coloured substances wherewith it is mixed. The metal is also found, separate from any matrix, in lumps or visible grains mixed with sands. Thus it is met with in many rivers of Europe as well as the other quarters of the world. It is also visibly dispersed through masses of sand, particularly such as is of a yellowish-red or violet colour; and in this state it is so universally diffused through every kind of earth, that Mr. Bergman thinks it the most common of all the metals, iron alone excepted. If 100 pounds of sand contain 24 grains of gold, the separation is said to be worth attending to. In Africa 5 pounds of sand often yield 63 grains of gold, or even more; and the heaviest sand, which is often black or red, contains the most. In Hungary, however, only 10 or 12 grains of gold are contained in 10,000 pounds of sand; and even this trifling quantity has been extracted, though with loss.

Gold is brought down with most of the large rivers; even those which do not take their rise in mountains where gold is found. In Transylvania the river of Avanyos affords subsistence to upwards of 700 gipsy families, who collect the gold from it. In Brasil it is found in such abundance, that their torrents are often turned with great labour and expence into new beds, in order to gather the gold there deposited by the running waters. Gold has also been found lately near the Wicklow mountains in Ireland. Of this discovery a very circumstantial account is given in the Philosophical Transactions for the year 1796.

Gold is said to be mineralized, when it is mixed with some other substance in such a manner as not to be acted upon by aqua regia. In this manner gold is mineralized.

1. *By Sulphur.* Many have insisted, that, as gold and sulphur are not found to have any chemical attraction for one another, it is impossible that marcasite can contain any of the metal, or indeed that it can be found in any ore containing sulphur: but since we know by experience that gold can be melted out of these ores, even after they have been digested in aqua-regia, and that gold likewise enters into their sulphurated regulus, there is the greatest reason to believe that some third substance, probably a metal, has by its admixture enabled the sulphur to unite with a certain quantity of gold. Marcasites however contain, at any rate, only a small quantity of the precious metal; and none is to be expected from them in places where no gold is in the neighbourhood. "I am not perfectly clear (says Cronstedt) whether the gold is really dissolved and indurated, or, if I may so express myself, *vitriified* in the *sebirks*; provided by this mineral body we mean a garnet substance. But I have seen a piece of what is called *sebir*, whose texture was exactly like the Schemnitz blende, and in this case it might perhaps hold the same contents."

2. *With Sulphur by means of Iron:* Golden pyrites, or marcasitical gold-ore. This is a close and compact substance of a bright yellow colour. Here the gold is said to be mineralized by sulphur by means of iron, because it cannot be extracted by aqua-regia or by amalgamation. A kind of gold pyrites is found at Adelfors in the province of Smoland, which contains an ounce or less of gold in an hundred weight of the ore. The Transylvania gold pyrites, according to Brunnich, in which no gold can be perceived by the naked eye, contain from 50 to 100 and 110 ounces and upwards in an hundred weight. Those where the gold appears in the pyrites like fireweed Spanish snuff hold 250 ounces; but they are very scarce. The mountain of Iaczebaya, near Zalathna, is remarkable for its

gold pyrites; and here they seem also to contain semimetallic parts.

The following is M. Magellan's method of accounting for the union of gold with this kind of pyrites. "It is well known that gold may be dissolved by liver of sulphur. The process given for this purpose by M. Apligny, p. 156 of his *Treatise on Colours*, is as follows: Reduce to powder four pounds of vegetable alkali (salt of tartar), and as many of sulphur, with one of leaves of gold. Melt the mixture in a crucible with its cover, pour the fused matter out on a marble stone, pound it again when cold, and put the whole in a matress with hot water; which, being filtrated, is of a greenish-yellow colour, containing the gold dissolved. Now, as we know that *hepar sulphuris* has been found in several pyrites, and Mascagni says that he found it in those lagoons near Sienna in Italy, is it not very natural to conclude, that this noble metal may be really mineralized in the auriferous pyrites?"

3. *Auriferous Cinnabar*, in which the metal is mineralized by means of quicksilver, said to be found in Hungary. Mr. Sage speaks of a specimen of gold from Hungary, late in the French king's cabinet at Paris, which is crystallized into quadrangular prisms of a grey-yellowish colour and a brittle consistency, which he supposes to be the result of a mercurial amalgam of native gold.

4. *The Schemnitz Blende*, in which the gold is mineralized by means of zinc and iron. Cronstedt informs us that the ores of zinc at Schemnitz in Hungary contain a great deal of silver, and that this silver is very rich in gold. Professor Brunnich enumerates the following varieties of this ore. 1. Where the metal is mineralized by means of a cubic lead-ore, containing silver found in the mines of Michaeli and some places in Transylvania. 2. By a copper pyrites with silver. This kind of ore is called *gifs* in Hungary: it has a compact surface of a pale yellow colour, but must not for that reason be confounded with the auriferous pyrites. 3. The Cremonitz-ores in which the metal is mineralized by means of red gilder ore. 4. By means of antimony, in which it sometimes appears. This kind is found at the foot of the Carpathian mountains. 5. By cubic lead-ore, iron, and some unknown volatile parts. This ore, as described by Scopoli, is of a black colour; the richest pieces are lamellated almost like an iron-glimmer, with a degree of flexibility. The vein is quartz, which is sometimes loose, and the metal scattered very minutely in it. It is found in Transylvania. 6. Native gold, with black-lead (or molybdæna), has been found near Rimezembat in Upper Hungary; but our author (Professor Brunnich) has not had any opportunity of examining whether it is mineralized by it or not. In all the above species the gold is either entirely native, but so minutely divided, and so loosely scattered, that it can only be seen through microscopes, and often cannot be seen at all before it is separated by various processes: or it may not be in the form of native gold, but the metal as it were in embryo; in which case fire is necessary to bring the constituent parts together, and to add those that are wanting; in that case likewise it is never without silver.

"To these (says Mr. Magellan) may be added the following ores. 1. Gold, with arsenical pyrites, is found also at Saltzberg in Tyrol, in mountains of quartz and schistus. It contains only 25 grains in the quintal; nevertheless it affords a profit of 500l. *per annum*. 2. With a white, red, or vitreous silver-ore, near Cremonitz and Schemnitz in Hungary. 3. With a sulphurated ore of silver, iron, lead, and manganese, at Nagaya in Transylvania. Its specific gravity is 4.043, and it is said to afford 10 ounces per quintal. 4. With sulphurated iron, copper, and manganese, at Nagaya."

The strongest heat of any furnace does not change the metallic properties of gold. Kunckel and Boyle made the experiment

by exposing gold for several months to the fire of a glass-house. It appears, however, that, by the violent heat of the sun-beams collected in the focus of a burning-glass, some alteration may be produced in it. Homberg observed that gold, when exposed to the lens of Tschirnhausen, formed, was volatilized, and even vitrified; and Macquer found, that the metal, when exposed to the lens of Mr. Trudaine, exhaled a fume which gilded silver, and was therefore gold in a volatile state: the globule of melted gold was agitated with a rapid circular motion, and became covered with a dull and as it were calciform pellicle; and lastly, that a violet vitrification was formed on the middle of the globule. This vitrification gradually extended, and produced a kind of button, flatter, or of a larger curvature, than that of the globule, and which stuck upon it as the transparent cornea appears on the sclerotica of the eye. This glass increased in size, while the gold itself continually diminished: the support always appeared tinged with a purple colour, seemingly produced by the absorption of part of the glass. Time did not permit him to vitrify a quantity of gold entirely. He observes, that it is a necessary condition that the violet glass should be reduced with combustible matters, in order to justify the assertion that it is the calx of that perfect metal, which would evidently appear to be the case if it became revived into gold. But however this may be, Mr. Fourcroy is of opinion that this ought to be considered as a true vitrified calx of gold; and this with the greater probability, as in many operations with this metal the purple colour is constantly produced, and many preparations of gold are employed to give that colour to enamel and porcelain. "Gold (says he) is therefore calcinable like the other metals; and only requires, as likewise does silver, a stronger heat, and a longer time to unite with the base of air than other metallic substances." Mr. Kirwan on the other hand tells us, that "gold exposed to the utmost heat of Mr. Parker's lens for some hours lost no sensible part of its weight; yet, when in contact with earthy matters, it communicated a blue or purplish tinge to them; so that he believes an exceeding small portion of it might be dephlogisticated."

This experiment with the lens of Mr. Parker does not invalidate that of Macquer: for either Trudaine's lens may be more powerful than Mr. Parker's, or, the air in France being more clear than in England, the action of the sun might be stronger. We are assured, however, that by means of the electric shock gold may be instantaneously calcined and even vitrified; whence we must conclude, not only that gold is really calcinable, but that the electric fire is almost infinitely more powerful than any other; as by its means we may in a moment accomplish what either cannot be done otherwise at all, or very imperfectly, even by the fiercest fire we can raise. The flame of a lamp blown by dephlogisticated air is also found sufficient to volatilize gold.

Gold, being thus indestructible by the common operations of fire, equally resists its slow action in the atmosphere. It is altogether exempted from rusting; and though its surface becomes tarnished by exposure to the air, it is merely in consequence of the deposition of foreign bodies upon it. Water produces no change, says Mr. Fourcroy; though, according to the experiments of Lagaraye, it seems capable of dividing it nearly in the same manner as it does iron.

Gold combines with various metals, and is commonly alloyed in a certain proportion with copper, which gives it a red colour and greater firmness than it possesses when very pure, at the same time that it is thus rendered more fusible. In this state it is used for money, plate, and toys of different kind. It is sometimes also alloyed with silver, which deprives it of its colour, and renders it very pale: this alloy, however, is not made without some difficulty, on account of the very different specific gravities of the two metals, as Homberg observed, who saw

them separate during their fusion. It is the alloy of gold with silver that forms the green gold of the jewellers and gold-beaters.

As gold has been rendered, by the universal consent of mankind, the most valuable substance in the world, it is of great consequence to be able to discover its degree of purity, in order to prevent the adulterations which would naturally be practised, and to produce an equality of value in the different pieces dispersed in commerce. The chemical methods by which this is accomplished are related under the articles *CHEMISTRY* and *ESSAYING of Metals*. To ascertain with precision the quantity of imperfect metal it may contain, a given mass of gold is supposed to contain 24 parts called *carats*; each carat being supposed divided into 32 parts called *thirty seconds of a carat*. If the gold after the operation has lost one grain in 24, it is gold of 23 carats; if it has lost a grain and a half, it is gold of 22 carats, 16 thirty-seconds, and so on. The weight used in the assay of gold is called the *assay weight*, and usually consists of 24 grains; it is divided into 24 carats, which are likewise subdivided into 32 parts. An assay weight is likewise used which weighs 12 grains; and is likewise divided into 24 carats, subdivided again into thirty-seconds.

The scarcity and great price of gold prevent its being made into vessels or utensils; but as its brilliancy and colour are agreeable, methods have been found of applying it to the surface of a great number of bodies, which it thus not only beautifies, but by its indestructibility preserves from the injuries of the atmosphere. The art of applying it in this manner is called *gilding*; and the immense ductility of gold, already mentioned, renders it capable of being applied in this manner at much less expence than could be imagined. It is also commonly employed either in a state of solution by acids, or amalgamated with mercury, in what is called *water gilding*. It was formerly used in medicine, and great virtues were ascribed to it; whence the great number of golden tinctures, elixirs, &c. of quacks; but all these are now deservedly exploded, and the best practitioners allow that gold, in whatsoever manner it be prepared, is either inactive or dangerous.

Gold, in its metallic state, cannot be combined with the trifling earths, but its calces may; for which reason they are often used in enamel-painting and in porcelain, where they produce a beautiful violet-colour. Glass is tinged by them of a beautiful red; of which we have an account in Neri's art of glass-making; though Dr. Lewis says he never could succeed in making the colour diffuse itself equally throughout the substance of the glass. See *Colouring of GLASS*.

The preparation of gold called *aurum fulminans* is taken notice of under the article *CHEMISTRY*, p. 447. M. Magellan takes notice of its extraordinary fulminating property, and says that its *fragor* is 64 times greater than that of an equal quantity of gunpowder. According to Bergman, the strength of the explosion is 176 times greater than that of gunpowder (20 grains of aurum fulminans being equivalent to half a pound of gunpowder). Bergman accounts for the amazing strength of this explosion, by supposing it owing to the quantity of air extricated at the time; but this, according to his own account, cannot be at all sufficient for such a purpose; and Magellan is of opinion that "this wonderful phenomenon seems not yet completely accounted for by any hypothesis yet known." See the article *EXPLOSION*.

"It is on account of the singular and excellent natural qualities of this metal (says our author), which are considerably heightened by its scarcity, that gold is so much valued among all the civilized nations of the world." Mr. Panton, in his *Metrologie*, p. 94. says, that one cubic foot (French measure) of gold is worth 2,153,000 *livres tournoises*, or 89,708 guineas and seven shillings, supposing the *Louis d'Or* to be equal to the

guinea; and that the respective value of the same cubic foot of gold is equal to 25.6 cubic feet of silver; each of this last metal being reckoned worth about 84,000 French livres, or 3503 guineas and eight shillings: so that if we suppose the monied specie in France to be but two *milliards* of French livres, according to the estimation of Mr. Neckar in his *Treatise upon the Commerce of Corn*, the whole amount should make but a solid cube of gold less than 10 feet on each side. So trifling is the physical object that excites the activity of 25 millions of the human species, the number that is said to be that of the inhabitants of France.

We shall close this article with some observations by M. Magellan on the state in which gold is found in the bowels of the earth, and consequently of the origin of gold ores. "As to the natural existence of gold in the bowels of the earth (says he), there have been two opinions among mineralogists; some pretending that it is only found in its *metallic* or *native* form; and others, that it is sometimes found *mineralized* in an intimate union with other substances. Mr. Kirwan holds the former, and the celebrated Bergman the latter. But, says Mr. Kirwan, 'though Mr. Bergman inclines to the opinion of the mineralization, yet he is candid enough to own, that the gold, when extracted from this ore, is of a granular or angular form. It is therefore very doubtful, whether it was not rather *mixed*, than truly combined with the sulphur and iron: and its proportion being exceedingly small, so that 100 pounds of the pyrites scarcely contain an ounce of gold, it is not a wonder that it should escape the action of aqua-regia; more especially as the nitrous acid becomes so phlogisticated by acting on the pyrites, as not to be able to dephlogisticate the marine. Likewise mercury, by reason of the gold particles being enveloped in the sulphureous iron, can have no access to it.'

"These arguments (says M. Magellan) against the true mineralization of gold are fully answered by the facts already mentioned. Besides, it is well known, that gold can be combined and calcined, *via ficta*, by the liver of sulphur and semimetals. This being acknowledged on both sides of the question, why should we insist on denying this mineralization, when it is out of doubt, among mineralogists of rank, that volcanic fires have had a great share in the convulsions and revolutions of this globe, of which every one has the most convincing proofs almost every where. The account given by Mr. Hiequet of the gold mines at Nagyag in Transylvania, the ancient Dacia, which lies about 45° latitude, offers the most convincing proofs of this assertion. The country all round these mines bears an incontestable appearance of being a volcanic one; and among various other metals, there are at least 13 kinds of gold ores, most of them mineralized. These are, 1. Gold mineralized by sulphur, zinc, and arsenic, in a grey-yellowish volcanic ore, which is called *cottoners*, or cotton-ore, on account of its lightness and texture. 2. By iron and arsenic, formed by strata; one containing black silver ore, then spatum, galena, quartz, and grey gold ore: it yields about half an ounce in the 100 pounds. 3. By sulphur, antimony, zinc, some arsenic, and sometimes iron: this is a grey-gold ore mixed with some quartz. 4. In the form of crooked threads mixed with quartz and gypseous spath; a poor mine. 5. Dendritiform, like the mocho stone, or the agate from Aberstein in the Palatinate; but these black dendrites are in a reddish stone. 6. Amorphous, very compact, in small grains, with spath and quartz. A quintal of it yields two ounces of gold, and more of silver. 7. By sulphur, great part of zinc, and a little antimony and arsenic; not rich. 8. Of a black or dark-reddish colour, containing an auriferous pyrites; not rich. 9. Of a bluish colour, mineralized by sulphur, antimony, iron, and a little arsenic mixed with silver; very rich in gold. 10. Partly laminated with needles of a blackish yellow colour: this gives 66 ounces of gold per 2 of gold, according to Scopoli.

11. Foliated with gypseous spath and yellow pyrites. 12. In irregular lamina, on a greyish argille. The gold looks like silver, and is surrounded by spars of a pale rosy colour. 13. In crystallized laminae from two to four lines diameter, of an hexangular form, and very much resembling *molybdæna*. The vein was lost for some time, but lately found again on mining for letting out water from the main. This ore is very rare, and has given 372 ounces per $\frac{1}{2}$ of a mixed metal; five of which were gold, and one of silver.

Method of Recovering Gold from Gilt Works. The solubility of gold, and the indissolubility of silver, in aqua regia, affords a principle on which gold may be separated from the surface of silver; and on this foundation different processes have been contrived, of which the two following appear to be the best. Some powdered sal ammoniac, moistened with aquafortis into the consistence of a paste, is spread upon the gilt silver, and the piece heated till the matter smokes and becomes nearly dry; being then thrown into water, it is rubbed with a scratch brush composed of fine brass-wire bound together, by which the gold easily comes off. The other way is, by putting the gilt silver into common aqua regia, kept so hot as nearly to boil, and turning the metal frequently till it becomes all over black: it is then to be washed with a little water, and rubbed with the scratch brush, to get off what gold the aqua regia may have left. This last method appears preferable to the other; as the same aqua regia may be made to serve repeatedly till it becomes saturated with the gold, after which the gold may be recovered pure by precipitation with solution of vitriol, as directed under the article METALLURGY.

For separating gold from gilt copper, some direct a solution of borax to be applied on the gilt parts, but no where else, with a pencil, and a little powdered sulphur to be sprinkled on the places thus moistened; the principal use of the solution of borax seems to be to make the sulphur adhere; the piece being then made red hot, and quenched in water, the gold is said to be so far loosened as to be wiped off with a brush. Others mix the sulphur with nitre and tartar, and form the mixture with vinegar into a paste, which is spread upon the gilt parts.

Schlutter recommends mechanical means, as being generally the least expensive, for separating gold from the surface both of silver and copper. If the gilt vessel is round, the gold is conveniently got off by turning it in a lathe, and applying a proper tool, a skin being placed underneath for receiving the shavings: he says it is easy to collect into two ounces of shavings all the gold of a gilt vessel weighing thrice as many pounds. Where the figure of the piece does not admit of this method, it is to be properly fixed, and scrapers applied of different kinds according to its size and figure; some large, and furnished with two handles, one at each end; others small and narrow, for penetrating into depressed parts. If the gold cannot be got off by either of these ways, the file must be had recourse to, which takes off more of the metal underneath than the turning tool or the scraper, particularly than the former. The gold scrapings or filings may be purified from the silver or copper they contain, by the methods described under the article METALLURGY.

The editors of the *Encyclopédie* give a method of recovering the gold from wood that has been gilt on a water-size: this account is extracted from a memoir on the same subject, presented to the Academy of Sciences by M. de Montamy. The gilt wood is steeped for a quarter of an hour in a quantity of water sufficient to cover it, made very hot: the size being thus softened, the wood is taken out and scrubbed, piece by piece, in a little warm water, with short stiff bristle brushes of different sizes, some small for penetrating into the carvings, and others large for the greater dispatch in flat pieces. The whole mixture of water, size, gold, &c. is to be boiled to dryness, the dry matter

made red hot in a crucible to burn off the size, and the remainder ground with mercury, either in a mortar, or, where the quantity is large, in a mill.

GOLD-Coast. See GUINEA.

GOLD-Wire, a cylindrical ingot of silver, superficially gilt or covered with gold at the fire, and afterwards drawn successively through a great number of little round holes, of a wire-drawing iron, each less than the other, till it be sometimes no bigger than a hair of the head. See *WIRE-Drawing*. It may be observed that, before the wire be reduced to this excessive fineness, it is drawn through above 140 different holes; and that each time they draw it, it is rubbed afresh over with new wax, both to facilitate its passage, and to prevent the silver's appearing through it.

GOLD-Wire flattened, is the former wire flattened between two rollers of polished steel, to fit it to be spun on a stick, or to be used flat, as it is, without spinning, in certain stuffs, laces, embroideries, &c.

GOLD-Thread, or *Spun-gold*, is flattened gold, wrapped or laid over a thread of silk, by twisting it with wheel and iron-bobbins. To dispose the wire to be spun on silk, they pass it between two rollers of a little mill: these rollers are of nicely polished steel, and about three inches in diameter. They are set very close to each other, and turned by means of a handle fastened to one of them, which gives motion to the other. The gold wire in passing between the two is rendered quite flat, but without losing any thing of its gilding; and is rendered so exceedingly thin and flexible, that it is easily spun on silk-thread by means of a hand-wheel, and so wound on a spool or bobbin. See *WIRE-Drawing*.

GOLD-Leaf, or *Beaten Gold*, is gold beaten with a hammer into exceeding thin leaves, so that it is computed that an ounce may be beaten into 1600 leaves, each three inches square, in which state it takes up more than 159,052 times its former surface. See *GOLD-LEAF*. It must be observed, however, that gold is beaten more or less, according to the kind or quality of the work it is intended for; that for the gold-wire drawers to gild their ingots with is left much thicker than that for gilding the frames of pictures, &c. See *GILDING*.

Fulminating GOLD. See CHEMISTRY, p. 447.

Mosaic GOLD, is gold applied in pannels on a proper ground, distributed into squares, lozenges, and other compartments; part of which is shadowed to raise or heighten the rest. See *MOSAIC*.

GOLD Plates for Enamelling are generally made of ducat gold, whose fineness is from $23\frac{1}{2}$ to $23\frac{3}{4}$ carats; and the finest gold is the best for this purpose, unless where some parts of the gold are left bare and unpolished, as in watch-cases, snuff-boxes, &c. for which purpose a mixture of alloy is necessary, and silver is preferred to copper, because the latter disposes the plates to tarnish and turn green. See *ENAMELLING*.

Shell-GOLD, is that used by the gilders and illuminers, and with which gold letters are written. It is made by grinding gold leaves or gold-beaters' fragments with a little honey, and afterwards separating the honey from the powdered gold by means of water. When the honey is washed away, the gold may be put on paper or kept in shells; whence its name. When it is used, it is diluted with gum-water or soap-suds. The German gold-powder, prepared from the Dutch gold-leaf in the same manner, is frequently used; and when it is well coated with varnish, answers the end in japanners' gilding as well as the genuine.

GOLD-Size for burnished gilding is prepared of one pound and an half of tobacco-pipe clay, half an ounce of red chalk, a quarter of an ounce of black lead, forty drops of sweet oil, and three drams of pure tallow: grind the clay, chalk, and black lead, separately, very fine in water; then mix them

together, add the oil and tallow, and grind the mixture to a due consistence. Gold size of *Japanners* may be made by pulverizing gum animi and asphaltum, of each one ounce; red-lead, litharge of gold, and umbre, of each one ounce and a half, mixing them with a pound of linseed oil, and boiling them, observing to stir them till the whole be incorporated, and appears on growing cold of the consistence of tar: strain the mixture through a flannel, and keep it stopp'd up in a bottle for use. When it is used, it must be ground with as much vermilion as will give it an opaque body, and diluted with oil of turpentine, so that it may be worked freely with the pencil. A more simple preparation consists of one pound of linseed oil and four ounces of gum animi; powder the gum, and mix it gradually with the boiling oil; let it continue to boil till it becomes of the consistence of tar; strain it through a coarse cloth; keep and use it as the other.

GOLD-Finch, in ornithology. See **FRINGILLA**. These are seed-birds of very curious colours, and which, were they not so common in this country, would probably be very much esteemed.

They are usually taken about Michaelmas, and soon become tame; but they differ very much in their song. They frequently breed in the upper part of plum-trees, making their nests of the moss that grows upon apple-trees, and of wool; quilting the inside with all sorts of hairs they find upon the ground. They breed three times a-year; and the young are to be taken with the nest at about ten days old, and fed as follows: Pound some hemp-seed very fine in a mortar; then sift it through a sieve, and add to it as much wheat-bread as hemp-seed; and likewise a little flour of canary-seeds: then with a small stick or quill take up as much as the bigness of a white pea, and give them several times a-day. This ought to be made fresh every day: for if it is suffered to sour, it will hurt their stomachs, causing them to cast up their meat; which if they do, it is very probable that they will die. These young birds must be carefully kept warm till they can feed themselves, for they are very tender. In feeding, be sure to make your bird clean his bill and mouth. If any of the meat falls upon his feathers, take it off, or else he will not thrive. Such as eat hemp-seed, to purge them, should have the seeds of melons, succory, and mercury; or else let them have lettuce and plantane for that purpose. When there is no need of purging, give them two or three times a-week a little sugar or loam in their meat, or at the bottom of the cage; for all seeds have an oiliness, so that if they have not something to absorb it, in length of time it fouts their stomachs, and brings on them a flux which is very dangerous.

GOLD Fish. See the article **BARBEL**.

GOLDEN, something that has a relation to gold, or consists of gold.

GOLDEN-Calf, was a figure of a calf which the Israelites cast in that metal, and set up in the wilderness to worship during Moses's absence into the mount; and which that legislator at his return burnt, grinded to powder, and mixed with the water the people were to drink of; as related in *Exod.* xxxii. The commentators have been divided on this article: the pulverizing of gold, and rendering it potable, is a very difficult operation in chemistry. Many, therefore, suppose it done by a miracle; and the rest, who allow of nothing supernatural in it, advance nothing but conjectures as to the manner of the process. Moses could not have done it by simple calcination, nor amalgamation, nor antimony, nor calcination; nor is there one of those operations that quadrates with the text.

M. Stahl has endeavoured to remove this difficulty. The method Moses made use of, according to this author, was by dissolving the metal with hepar sulphuris; only, instead of the

vegetable alkali, he made use of the Egyptian natron, which is common enough throughout the east.

GOLDEN Fleece, in the ancient mythology, was the skin or fleece of the ram upon which Phryxus and Hella are supposed to have swam over the sea to Colchis; and which, being sacrificed to Jupiter, was hung upon a tree in the grove of Mars, guarded by two brazen-hoofed bulls, and a monstrous dragon that never slept; but was taken and carried off by Jason and the Argonauts.

Many authors have endeavoured to show that this fable is an allegorical representation of some real history, particularly of the philosopher's stone. Others have explained it by the profit of the wool-trade to Colchis, or the gold which they commonly gathered there with fleeces in the rivers. See **ARGO-NAUTS**.

Order of the GOLDEN Fleece, is a military order instituted by Philip the Good, duke of Burgundy, in 1429. It took its denomination from a representation of the golden fleece, borne by the knights on their collars, which consisted of flints and steels. The king of Spain is now grand master of the order, in quality of duke of Burgundy: the number of knights is fixed to thirty-one. It is usually said to have been instituted on occasion of an immense profit which that prince made by wool; though others will have a chemical mystery couched under it, as under that famous one of the ancients, which the adepts contend to be no other than the secret of the elixir wrote on the fleece of a sheep.

Oliver de la Marche writes, that he had suggested to Philip I. archduke of Austria, that the order was instituted by his grandfather Philip the Good, duke of Burgundy, with a view to that of Jason; and that John Germain bishop of Chalons, chancellor of the order, upon this occasion made him change his opinion, and assured the young prince that the order had been instituted with a view to the fleece of Gideon. William bishop of Tournay, chancellor likewise of the order, pretends that the duke of Burgundy had in view both the golden fleece of Jason and Jacob's fleece, i. e. the speckled sheep belonging to this patriarch, according to agreement made with his father-in-law Laban. Which sentiment gave birth to a great work of this prelate, in two parts: in the first, under the symbol of the fleece of Jason, is represented the virtue of magnanimity, which a knight ought to possess; and under the symbol of the fleece of Jacob he represents the virtue of justice. Paradin is of the same mind, and tells us that the duke designed to insinuate that the fabulous conquest which Jason is said to have made of the golden fleece in Colchis was nothing else but the conquest of virtue, which gains a victory over those horrible monsters, vice and our evil inclinations.

GOLDEN Number, in chronology, a number showing what year of the moon's cycle any given year is. See **CHRONOLOGY**, p. 525.

GOLDEN Rod, in botany. See **SOLIDAGO**.

GOLDEN Rose. The pope annually consecrates a golden rose on the fourth Sunday in Lent, which is sent to princesses, or to some church, as a mark of his peculiar affection.

GOLDEN Rule, in arithmetic, a rule or praxis, of great use and extent in the art of numbers; whereby we find a fourth proportional to three quantities given. The golden rule is also called the *Rule of Three* and *Rule of Proportion*. See its nature and use under the article **ARITHMETIC**, p. 317.

GOLDENGLEN, a town of Poland in the duchy of Courland, with a handsome castle, seated on the river Weia, in E. lon. 22. 31. N. lat. 56. 48.

GOLDSMITH, or, as some choose to express it, *silversmith*, an artist who makes vessels, utensils, and ornaments, in gold and silver. The goldsmith's work is either performed in the mould, or beaten out with a hammer or other instrument. All

works that have raised figures are cast in a mould, and afterwards polished and finished: plates or dishes, of silver or gold, are beat out from thin flat plates; and tankards, and other vessels of that kind, are formed of plates folded together, and their mouldings are beaten, not cast. The business of the goldsmiths formerly required much more labour than it does at present; for they were obliged to hammer the metal from the ingot to the thinness they wanted; but there are now invented flattening-mills, which reduce metals to the thinness that is required at a very small expence. The goldsmith is to make his own moulds, and for that reason ought to be a good designer, and have a taste in sculpture: he also ought to know enough of metallurgy to be able to assay mixed metals, and to mix the alloy.

The goldsmiths in London employ several hands under them for the various articles of their trade: such are the jeweller, the snuff-box and toy maker, the silver-turner, the gilder, the burnisher, the chaser, the refiner, and the gold beater. Goldsmiths are superior tradesmen: their wares must be assayed by the wardens of the company of this name in London, and marked; and gold is to be of a certain touch. No goldsmith may take above one shilling the ounce of gold, besides what he has for the fashioning, more than the buyer may be allowed for it at the king's exchange; and here any false metal shall be seized and forfeited to the king. The cities of York, Exeter, Bristol, &c. are places appointed for the assaying wrought-plate of goldsmiths; also a duty is granted on silver-plate of one and sixpence an ounce. Plate made by goldsmiths shall be of a particular fineness, on pain of forfeiting 10l.; and if any parcel of plate sent to the assayers is discovered to be of a coarser alloy than the respective standards, it may be broken and defaced. The fees for assaying are particularly limited.

GOLDSMITH (Oliver), a celebrated English writer, was born at Roscommon in Ireland in the year 1731. His father, who possessed a small estate in that county, had nine sons, of whom Oliver was the third. He was originally intended for the church; and with that view, after being well instructed in the classics, was, with his brother the Rev. Henry Goldsmith, placed in Trinity-college, Dublin, about the latter end of the year 1749. In this seminary of learning he continued a few years, when he took a bachelor's degree; but his brother not being able to obtain any preferment after he left the college, Oliver, by the advice of Dean Goldsmith of Cork, turned his thoughts to the study of physic; and, after attending some courses of anatomy in Dublin, proceeded to Edinburgh in the year 1751, where he studied the several branches of medicine under the different professors in that university. His beneficent disposition soon involved him in unexpected difficulties; and he was obliged precipitately to leave Scotland, in consequence of engaging himself to pay a considerable sum of money for a fellow-student.

A few days after, about the beginning of the year 1754, he arrived at Sunderland near Newcastle, where he was arrested at the suit of a taylor in Edinburgh, to whom he had given security for his friend. By the good offices of Laughlin Maclane, Esq. and Dr. Sleigh, who were then in the college, he was soon delivered out of the hands of the bailiff; and took his passage on board a Dutch ship to Rotterdam, where, after a short stay, he proceeded to Brussels: he then visited great part of Flanders; and after passing some time at Strasbourg and Lonvain, where he obtained a degree of bachelor of physic, he accompanied an English gentleman to Perne and Geneva.

It is undoubtedly fact, that this ingenious unfortunate man travelled on foot most part of this tour. He had left England with very little money; and being of a philosophical turn, and at that time possessing a body capable of sustaining every fatigue, and a heart not easily terrified with danger, he became an en-

thusiast to the design he had formed of seeing the manners of different countries. He had some knowledge of the French language and of music, and he played tolerably well on the German flute; which, from an amusement, became at some times the means of his subsistence. His learning produced him a hospitable reception at most of the religious houses; and his music made him welcome to the peasants of Flanders and other parts of Germany. "Whenever I approached," he used to say, "a peasant's house towards night-fall, I played one of the most merry tunes; and that procured me not only a lodging, but subsistence for the next day: but in truth (his constant expression) I must own, whenever I attempted to entertain persons of a higher rank, they always thought my performance odious, and never made me any return for my endeavours to please them."

On Mr. Goldsmith's arrival at Geneva, he was recommended as a proper person for a travelling tutor to a young man, who had been unexpectedly left a considerable sum of money by his uncle Mr. S——, formerly an eminent pawnbroker near Holborn. This youth, who had been articulated to an attorney, on receipt of his fortune determined to see the world; and, on his engaging with his preceptor, made a proviso that he should be permitted to govern himself; and Goldsmith soon found his pupil understood the art of directing in money-concerns extremely well, as avarice was his prevailing passion. His questions were usually how money might be saved, and which was the least expensive course of travel; whether any thing could be bought that would turn to account when disposed of again in London? Such curiosities on the way as could be seen for nothing he was ready enough to look at; but if the sight of them was to be paid for, he usually asserted that he had been told they were not worth seeing. He never paid a bill that he would not observe how amazingly expensive travelling was; and all this, though he was not yet twenty-one. During Goldsmith's continuance in Switzerland, he assiduously cultivated his poetical talent, of which he had given some striking proofs while at the college of Edinburgh. It was here he sent the first sketch of his delightful poem called the *Traveller* to his brother the clergyman in Ireland, who, giving up fame and fortune, had retired with an amiable wife to happiness and obscurity, on an income of only 40l. a-year.

From Geneva Mr. Goldsmith and his pupil visited the south of France; where the young man, upon some disagreement with his preceptor, paid him the small part of his salary which was due, and embarked at Marseilles for England. Our wanderer was left once more upon the world at large, and passed through a variety of difficulties in traversing the greatest part of France. At length his curiosity being satiated, he bent his course towards England, and arrived at Dover the beginning of the winter 1758. When he came to London, his stock of cash did not amount to two livres. An entire stranger in this metropolis, his mind was filled with the most gloomy reflections on his embarrassed situation. With some difficulty he discovered that part of the town in which his old acquaintance Dr. Sleigh resided. This gentleman received him with the warmest affection, and liberally invited him to share his purse till some establishment could be procured for him. Goldsmith, unwilling to be a burden to his friend, a short time after eagerly embraced an offer which was made him to assist the late Rev. Dr. Milner in instructing the young gentlemen at the academy at Peckham; and acquitted himself greatly to the Doctor's satisfaction for a short time: but having obtained some reputation by the criticisms he had written in the Monthly Review, Mr. Griffith the proprietor engaged him in the compilation of it; and, resolving to pursue the profession of writing, he returned to London, as the mart where abilities of every kind were sure of meeting distinction and reward. As his finances were by no means in a good state, he

determined to adopt a plan of the strictest economy, and took lodgings in an obscure court in the Old Bailey, where he wrote several ingenious little pieces. The late Mr. Newberry, who at that time gave great encouragement to men of literary abilities, became a kind of patron to our young author; and introduced him as one of the writers in the Public Ledger, in which his *Citizen of the World* originally appeared, under the title of *Chinese Letters*.

Fortune now seemed to take some notice of a man she had long neglected. The simplicity of his character, the integrity of his heart, and the merit of his productions, made his company very acceptable to a number of respectable families; and he emerged from his shabby apartments in the Old Bailey to the politer air of the Temple, where he took handsome chambers, and lived in a genteel style. The publication of his *Traveller* and his *Vicar of Wakefield* was followed by the performance of his comedy of the *Good-natured Man* at Covent-Garden theatre, and placed him in the first rank of the poets of the present age.

Among many other persons of distinction who were desirous to know him, was the duke of Northumberland, and the circumstance that attended his introduction to that nobleman is worthy of being related, in order to show a striking trait of his character. "I was invited," said the Doctor (as he was then universally called), "by my friend Mr. Piercy, to wait upon the duke, in consequence of the satisfaction he had received from the perusal of one of my productions. I dressed myself in the best manner I could; and, after studying some compliments I thought necessary on such an occasion, proceeded to Northumberland-house, and acquainted the servants that I had particular business with his Grace. They showed me into an anti-chamber; where, after waiting some time, a gentleman very genteely dressed made his appearance. Taking him for the duke, I delivered all the fine things I had composed in order to compliment him on the honour he had done me: when, to my great astonishment, he told me I had mistaken him for his master, who would see me immediately. At that instant the duke came into the apartment; and I was so confused on the occasion, that I wanted words barely sufficient to express the sense I entertained of the duke's politeness, and went away extremely chagrined at the blunder I had committed."

Another feature of his character we cannot help laying before the reader. Previous to the publication of his *Deserted Village*, the bookseller had given him a note for one hundred guineas for the copy, which the Doctor mentioned a few hours after to one of his friends: who observed, it was a very great sum for so short a performance. "In truth," replied Goldsmith, "I think so too; I have not been easy since I received it; therefore I will go back and return him his note:" which he absolutely did; and left it entirely to the bookseller to pay him according to the profits produced by the sale of the piece, which turned out very considerable.

During the last rehearsal of his comedy intitled *She stoops to Conquer*, which Mr. Coleman had no opinion would succeed, on the Doctor's objecting to the repetition of one of Tony Lumpkin's speeches, being apprehensive it might injure the play, the manager with great keenness replied, "Piha, my dear Doctor, do not be fearful of squibs, when we have been sitting almost these two hours upon a barrel of gunpowder." The piece, however, contrary to Mr. Coleman's expectation, was received with uncommon applause by the audience; and Goldsmith's pride was so hurt by the severity of the above observation, that it entirely put an end to his friendship for the gentleman that made it.

Notwithstanding the great success of his pieces, by some of which, it is asserted upon good authority, he cleared 1800*l.* in one year, his circumstances were by no means in a prosperous

situation; which was partly owing to the liberality of his disposition, and partly to an unfortunate habit he had contracted of gaming; the arts of which he knew very little of, and consequently became the prey of those who were unprincipled enough to take advantage of his simplicity.

Just before his death he had formed a design for executing an Universal Dictionary of Arts and Sciences, the prospectus of which he actually published. In this work several of his literary friends (particularly Sir Joshua Reynolds, Dr. Johnson, Mr. Beauclerc, and Mr. Garrick) had undertaken to furnish him with articles upon different subjects. He had entertained the most sanguine expectations from the success of it. The undertaking, however, did not meet with that encouragement from the booksellers which he had imagined it would undoubtedly receive; and he used to lament this circumstance almost to the last hour of his existence.

He had been for some years afflicted, at different times, with a violent strangury, which contributed not a little to embitter the latter part of his life; and which, united with the vexations which he suffered upon other occasions, brought on a kind of habitual despondency. In this unhappy condition he was attacked by a nervous fever, which, being improperly treated, terminated in his dissolution on the 4th of April 1774.

As to his character, it is strongly illustrated by Mr. Pope's line, "*In wit a man, simplicity a child.*" The learned leisure he loved to enjoy was too often interrupted by distresses which arose from the liberality of his temper, and which sometimes threw him into loud fits of passion: but this impetuosity was corrected upon a moment's reflection; and his servants have been known, upon these occasions, purposely to throw themselves in his way, that they might profit by it immediately after; for he who had the good fortune to be reproved was certain of being rewarded for it. The universal esteem in which his poems were held, and the repeated pleasure they give in the perusal, is a striking test of their merit. He was a studious and correct observer of nature; happy in the selection of his images, in the choice of his subjects, and in the harmony of his versification; and though his embarrassed situation prevented him from putting the last hand to many of his productions, his *Hermit*, his *Traveller*, and his *Deserted Village*, decidedly claim a place among the most finished pieces in the English language.

Besides the works already mentioned, he wrote, 1. *History of the earth and animated nature*, 6 vols. 8vo. 2. *History of England*, 4 vols. 8vo. 3. *History of Rome*, 2 vols. 4. *Abridgements of the two last*, for the use of schools. 5. *A view of experimental philosophy*, 3 vols. 8vo.; a posthumous work, not esteemed. 6. *Miscellanies*, &c.

GOLF, the name of a certain game among the Scots, and said to be peculiar to their country. Among them it has been very ancient; for there are statutes prohibiting it as early as the year 1457, lest it should interfere with the sport of archery. It is commonly played on rugged broken ground, covered with short grass, in the neighbourhood of the sea-shore. A field of this sort is in Scotland called *links*. The game is generally played in parties of one or two on each side. Each party has an exceeding hard ball, somewhat larger than a hen's egg. This they strike with a slender and elastic club, of about four feet long, crooked in the head, and having lead run into it, to make it heavy. The ball being struck with this club will fly to the distance of 200 yards, and the game is gained by the party who puts his ball into the hole with the fewest strokes. But the game does not depend solely upon the striking of the longest ball, but also upon measuring the strength of the stroke, and applying it in such direction as to lay the ball in smooth ground, whence it may be easily moved at the next stroke. To encourage this amusement, the city of Edinburgh, A. D. 1744, gave to

the company of golfers a silver club, to be played for annually by the company, the victor to append a gold or silver piece to the prize. It has been played for every year since, except the years 1746, 1747. For their better accommodation, 22 members of the company subscribed 30*l.* each in the year 1768, for building a house, where their meetings might be held. The spot chosen for this purpose was the southwest corner of Leith links, where an area was taken in feu from the magistrates of Edinburgh, and a commodious house and tavern built upon it.

GOLIUS (James), a celebrated professor of Arabic and the mathematics at Leyden, was descended from a very honourable family, and born at the Hague in the year 1596. He was put to the university of Leyden, where he studied under Erpinus; and having made himself master of all the learned languages, applied himself to the mathematics, physics, and divinity. He afterwards travelled into Africa and Asia, and became greatly esteemed by the king of Morocco, and the sultan of the Turks. He at length returned to Leyden, loaded with manuscripts, and in 1624 succeeded Erpinus in the Arabic chair. As he had been an eye-witness of the wretched state of Christianity in the Mahometan countries, he was filled with the compassion of a fellow-christian; and none ever solicited for a place of honour and profit with greater eagerness, than he for procuring a new edition of the New Testament, in the original language, with a translation into the vulgar Greek, by an Archimandrite; and as there are some of these Christians who use the Arabic tongue in divine service, he also took care to have dispersed among them an Arabic translation of the Confession of the Protestants, together with the Catechism and Liturgy. In 1626 he was also chosen professor of mathematics, and discharged the functions of both professorships with the greatest applause during 40 years. He was likewise appointed interpreter in ordinary to the states for the Arabic, Turkish, Persian, and other eastern languages, for which he had an annual pension, and a present of a gold chain, with a very beautiful medal which he wore as a badge of his office. He published, 1. The life of Tamerlane, written in Arabic. 2. The history of the Saracens, written by Elmacen. 3. Alferganus's elements of Astronomy, with a new version and learned commentaries. 4. An excellent Arabic Lexicon. 5. A Persian Dictionary. He died in 1667.

GOLTZIUS (Henry), a famous engraver and painter, born in 1558 at Mulbreck in the duchy of Juliers. He was taught the art of engraving by Theodore Cuerehert; and succeeded very wonderfully in it, notwithstanding the disadvantage of a lame hand, which was occasioned by his falling into the fire whilst young. He was first employed by his master, and afterwards he worked for Philip Galle. Domestic troubles and ill health occasioned him to travel. He went through Germany into Italy, and passed under a feigned name, that his studies might not be interrupted. He visited Bologna, Florence, Naples, and Venice, constantly applying himself to drawing from the antique statues, and the works of the great masters. At Rome he resided the longest; and there he produced several excellent engravings from Polidoro Raphael, and other eminent painters. On his return to his native country he established himself at Haerlem, where he engraved many of the drawings which he had made during his abode in Italy. He died at Haerlem in 1617, aged 59. He is said to have been forty years old before he began to paint; yet his pictures are spoken of with the greatest commendation; but as he did not produce any great number of them, they are of course but rarely to be met with. As an engraver, he deserves the highest commendation. No man ever surpassed, and few have equalled him in the command of the graver and freedom of execution. He copied the style of Albert Durer, Lucas of Leyden, and other old masters, with

astonishing exactness. Sometimes his engravings are neat in the extreme; at other times they are performed in a bold open manner, without the least restraint. He also engraved several of his own designs on wood, in that manner which is distinguished by the appellation of *chiaro-scuro*. Of his prints, which are very numerous, it may here suffice to specify two or three of the most celebrated: 1. Six large upright plates, known by the name of his *master-pieces*. These, it is said, he engraved to convince the public that he was perfectly capable of imitating the styles of Albert Durer, Lucas Van Leyden, and other masters, whose works were then held in higher estimation than his own: for he had adopted a new manner, which he pursued because he thought it superior, and not because he was incapable of following the others. It is reported that with one of them, the Circumcision, which he smoked to give it the more plausible air of antiquity, he actually deceived some of the most capital connoisseurs of the day; by one of whom it was bought for an original engraving of Albert Durer. The subjects of these plates are, The Annunciation of the Virgin; the Meeting of the Virgin with Elizabeth, called the Visitation; the Nativity of Christ; the Circumcision of Christ; the Adoration of the wise Men; the Holy Family. 2. The Judgment of Midas, a large plate lengthwise. 3. The Venetian Gall, a large plate lengthwise, from Theodore Bernard. 4. The Boy and Dog, a middling sized upright plate, from a design of his own; an admirable print. 5. The Necromancer, a middling sized upright oval print, in *chiaro scuro*. 6. Night in her Chariot, the same.

GOLTZIUS (Hubert), a learned German, born at Venlo in the duchy of Gueldres in 1526. His father was a painter, and himself was bred to the art under Lambert Lombard: but he did little at painting, or at least his pictures are very scarce; for having a peculiar turn to antiquities, he devoted himself to the study of medals. He travelled through Germany, France, and Italy, to make collections, as well as to draw from thence all the lights he could towards clearing up ancient history: he was the author of several excellent works, in which he was so accurate and nice, that he had them printed at his own house, under his own correction, and even engraved the plates and medals with his own hand. His veneration for Roman antiquities was so great, that he gave all his children Roman names: and married for his second wife, the widow of the antiquarian Martinus Smetius; probably more for the sake of Smetius's medals and inscriptions than for his own sake; and was punished accordingly by her plaguing him all his life, if she did not shorten it. He died in 1583.

GOMBAULD (John Ogier de), one of the best French poets in the 17th century, and one of the first members of the French academy, was born at St. Just de Lussac. He acquired the esteem of Mary de Medicis, and of the wits of his time. He was a Protestant, and died in a very advanced age. He wrote many works in verse and prose. His epigrams, and some of his sonnets, are particularly esteemed.

GOMBROON, a considerable seaport of Persia, in the province of Farsistan. It is called by the natives Bandar Abassi, and is seated on a bay, 12 miles N. of the E. end of the island of Kish, and nine miles from the famous island of Ormus. The best houses are built of brick dried in the sun, and stand close to each other, being flat at the top, with a square turret, having holes on each side for the free passage of the air. Upon these roofs, those that stay in the town sleep every night in the summer season. The common people have wretched huts, made with the boughs of palm-trees, and covered with leaves. The streets are narrow and irregular. The English and Dutch have factories here, which is a great advantage to the trade of the place. The soil is barren, but provisions brought from other countries are very plentiful. The weather is so hot in June,

July, and August, that this place is extremely unhealthy; and therefore the English factory retire to Assen during those months. It is frequented by people of several nations, as well Europeans as others; and the Banyans are so numerous, that they bribe the governor not to permit any cows to be killed in the town. Lon. 36. 35. E. Lat. 27. 30. N.

GOMERA, one of the Canary islands lying between Ferro and Teneriffe. It has one good town of the same name, with an excellent harbour, where the Spanish fleet often take in refreshments. They have corn sufficient to supply the inhabitants, with one sugar-work, and great plenty of wine and fruits. It is subject to the Spaniards, who conquered it in 1445. W. lon. 17. 10. N. lat. 28. 0.

GOMOZIA, in botany; a genus of the digynia order, belonging to the tetrandria class of plants. The corolla is campanulated, quadrid above; there is no calyx; the berry is bilocular.

GOMPHOSIS, in anatomy, that kind of articulation by which the teeth are fixed in the jaw-bone. See ANATOMY, page 164.

GOMPHRÆNA, GLOBE AMARANTH, in botany; a genus of the digynia order, belonging to the pentandria class of plants, and in the natural method ranking under the 54th order, *Miscellaneæ*. The calyx is coloured; the exterior one triphyllous, or diphyllous, with two carinated connivent leaflets; the nectarium cylindrical, with ten teeth; the capsule monospermous. There are seven species; but only one of them is commonly cultivated in our gardens, viz. the globosa. It hath an upright stalk branching all round, two or three feet high, garnished with oval, lanceolate, and opposite leaves; and every branch and side-shoot terminated by a close globular head of flowers, composed of numerous, very small starry florets, closely covered with dry scaly calices placed *imbricatim*, persistent, and beautifully coloured purple, white, red, or striped and variegated. The flowers themselves are so small, and closely covered with the scaly calices, that they scarcely appear. The numerous closely placed scaly coverings being of a dry firm consistence, coloured and glittering, collected into a compact round head, about the size of an ordinary cherry, make a fine appearance. They are annual plants, natives of India; and require artificial heat to raise and forward them to a proper growth, so that they may flower in perfection, and produce ripe seed. They flower from June to November; and if the flowers are gathered when at full growth, and placed out of the sun, they will retain their beauty several months.

GONAQUA, the name of a nation inhabiting about the Cape, and supposed by Dr. Sparman to be a mixture of Hottentots and Caffres.

GONDAR, the metropolis of Abyssinia, situated on a hill of considerable height, and containing about 10,000 families in time of peace. The houses are chiefly of clay; the roofs thatched in the form of cones, which is always the construction within the tropical rains. They have no shops; but carry on their trade in a large square, where they expose their merchandise to sale, laid upon mats; and gold and rock-salt are the only money made use of. Each bar of salt is a foot in length, and they break off as much as they agree for in the purchase of small wares. There are about 100 churches, and their patriarch depends on that of Alexandria. The priests have a great power with the people, and sometimes abuse it grossly. The rainy season begins in April, and does not cease till the end of September, whence the Nile, and other rivers that have their source in Abyssinia, overflow their banks every year. The inhabitants are tall and comely, and their complexion a dun, or olive colour. The habit of the better sort is made of silks and cottons; but the common people have only drawers to hide their nakedness. It is 180 miles S. E. of

Sennar, and near 1000 S. of Grand Cairo. Lon. 37. 33. E. Lat. 12. 34. N.

GONDI (John Francis Paul), Cardinal de Retz, was the son of Philip Emanuel de Gondi, Count de Joigny, lieutenant-general, &c. and was born in 1613. From a doctor of the Sorbonne, he first became coadjutor to his uncle John Francis de Gondi, whom he succeeded in 1654 as archbishop of Paris; and was finally made a cardinal. This extraordinary person has drawn his own character in his memoirs with impartiality. He was a man who, from the greatest degree of debauchery, and long languishing under its consequences, made himself adored by the people as a preacher. At the age of 23, he was at the head of a conspiracy against the life of Cardinal Richelieu; he precipitated the parliament into cabals, and the people into sedition: he was (says M. Voltaire) the first bishop who carried on a civil war without the mask of religion. However, his intrigues and schemes turned out so ill, that he was obliged to quit France; and he lived the life of a vagrant exile for five or six years, till the death of his great enemy Cardinal Mazarin, when he returned on certain stipulated conditions. After assisting in the conclave at Rome which chose Clement IX. he retired from the world, and ended his life like a philosopher in 1679; which made Voltaire say, that in his youth he lived like Catiline, and like Atticus in his old age. He wrote his Memoirs in his retirement; the best edition of which is that of Amsterdam, 4 vols. 12mo. 1719.

GONDOLA, a flat boat, very long and narrow, chiefly used at Venice to row on the canals. The word is Italian, *gondola*. Du Cange derives it from the vulgar Greek *κονιολας*, "a bark," or "little ship;" Lancelot deduces it from *γόνδου*, a term in Athenæus for a sort of vase. The middle-sized gondolas are upwards of thirty feet long and four broad: they always terminate at each end in a very sharp point, which is raised perpendicularly to the full height of a man. The address of the Venetian gondoliers, in passing along their narrow canals, is very remarkable: there are usually two to each gondola, and they row by pushing before them. The fore-man rests his oar on the left side of the gondola: the hind-man is placed on the stern, that he may see the head over the tilt or covering of the gondola, and rests his oar, which is very long, on the right side of the gondola. *Gondola* is also the name of a passage boat of six or eight oars, used in other parts of the coast of Italy.

GONORRHEEA, an efflux of white, yellow, or greenish matter from the urethra; most commonly owing to venereal infection. See SURGERY.

GONZAGA (Lucretia), was one of the most illustrious ladies of the 16th century, and much celebrated for her wit, her learning, and her delicate style. Hortensio Lando wrote a beautiful panegyric upon her, and dedicated to her his dialogue of moderating the passions. Her beautiful letters have been collected with the greatest care. We learn from these, that her marriage with John Paul Manfrone was unhappy. She was married to him when she was not 14 years of age, and his conduct afterwards gave her infinite uneasiness. He engaged in a conspiracy against the duke of Ferrara; was detected and imprisoned by him; but, though condemned by the judges, not put to death. She did all in her power to obtain his enlargement, but in vain; for he died in prison, having shown such impatience under his misfortunes, as made it imagined he had lost his senses. She never would listen afterwards to any proposals of marriage, though several were made to her. All that came from her pen was so much esteemed, that a collection was made even of the notes she wrote to her servants; several of which are to be met with in the edition of her letters.

GOOD, in general, whatever is apt to increase pleasure, or to diminish pain in us; or, which amounts to the same, whatever is able to procure or preserve to us the possession of agreeable

sensations, and remove those of an opposite nature. *Moral* Good denotes the right conduct of the several senses and passions, or their just proportion and accommodation to their respective objects and relations. See *MORALS*.

Good Abearing, (*onus gestus*), signifies an exact carriage or behaviour of a subject towards the king and the people, whereunto some persons upon their misbehaviour are bound: and he that is bound to this is said to be more strictly bound than to the peace; because where the peace is not broken, the surety *de bono gestu* may be forfeited by the number of a man's company, or by their weapons.

Good Behaviour, in law, an exact carriage and behaviour to the king and his people. A justice of the peace may, at the request of another, or where he himself sees cause, demand surety for the good behaviour; and to that end the justice may issue out his warrant against any person whatsoever, under the degree of nobility; but when it is a nobleman, complaint is to be made in the court of chancery, or king's bench, where such nobleman may be bound to keep the peace. Infants and femme-coverts, who ought to find surety by their friends, may be bound over to their good behaviour; as also lunatics that have sometimes lucid intervals, and all others who break the peace, or being suspected to do it by affrays, assaults, battery, wounding, fighting, quarrelling, threatening, &c. A person may be likewise bound to his good behaviour for a scandalous way of living, keeping bawdy-houses, gaming-houses, &c. and so may common drunkards, whoremongers, common whores, cheats, libellers, &c. He who demands surety for the peace, on any violence offered, must take an oath before the justice, that he goes in fear of his life, or some bodily harm, &c. and that it is not out of malice, but from a regard to his own safety.

Good-Friday, a fast of the Christian church, in memory of the sufferings and death of Jesus Christ. It is observed on the Friday in *holy* or *passion week*; and it is called, by way of eminence, *good*, because of the blessed effects of our Saviour's sufferings, which were a propitiatory or expiating sacrifice for the sins of the world. The commemoration of our Saviour's sufferings has been kept from the very first ages of Christianity, and was always observed as a day of the strictest fasting and humiliation. Among the Saxons it was called *Long-Friday*; but for what reason, except on account of the long fastings and offices then used, is uncertain. On Good-Friday the pope sits on a plain form; and after service is ended, when the cardinals wait on him back to his chamber, they are obliged to keep a deep silence, as a testimony of their sorrow. In the night of Good-Friday, the Greeks perform the obsequies of our Saviour round a great crucifix, laid on a bed of state, adorned with flowers; these the bishops distribute among the assistants when the office is ended. The Armenians, on this day, set open a holy sepulchre, in imitation of that of mount Calvary.

Good-Hope, or *Cape of Good-Hope*, the southern extremity of Africa, in 81. 23. E. lon. and 34. 29. S. lat. discovered by the Portuguese in 1493. Here is a neat well-built town, rising in the midst of a desert, surrounded by black and dreary mountains; or, in other words, the picture of successful industry. The storehouses of the Dutch East India company are situated next the water, and the private buildings lie beyond them, on a gentle ascent. The principal fort which commands the road is on the E. side; and another strong fort, called Amsterdam Fort, has been built on the W. side since the last war with England. The streets are broad and regular, intersecting each other at right angles. The houses in general are built of stone, and white-washed. There are two churches, one for the Calvinists, the established religion; the other for the Lutherans. The religion of the slaves is as little regarded here as in the colonies of other European states. In other respects, however, they are treated with humanity, and are lodged and boarded in a spacious house,

where they are likewise kept at work. These slaves, a few Hottentots excepted, were all originally brought from the E. Indies, and principally from Malacca. Another great building serves as an hospital for the sailors belonging to the Dutch East India ships which touch here. It is situated close to the Company's gardens. It is an honour to that commercial body, and an ornament to the town. The convalecents have free access to these gardens, where they enjoy the benefit of a pure wholesome air, perfumed by the fragrance of a great number of rich fruit-trees, aromatic shrubs, and odoriferous plants and flowers: they have likewise the use of every production in them. The inhabitants are fond of gardens, which they keep in excellent order. Though stout and athletic, they have not all that phlegm about them which is the characteristic of the Dutch in general. The ladies are lively, good-natured, familiar and gay. The heavy draught-work about the Cape is chiefly performed by oxen, which are here brought to an uncommon degree of docility and usefulness. The inhabitants in general travel in a kind of covered waggons, drawn by oxen, which better suit the roughness of the country than more elegant vehicles; but the governor and some of the principal people keep coaches, which are much in the English style, and are drawn by six horses. The ground behind the town gradually rises on all sides toward the mountains, called the Table Mountain, which is the highest; the Sugar loaf, so named from its form; the Lion's Head, Charles Mount and James Mount, or the Lion's Runip. From these mountains descend several rivulets, which fall into the different bays, as Table Bay, False Bay, &c. The view from the Table Mountain is very extensive and picturesque; and all along the vallies and rivulets among these mountains are a great number of delightful plantations. This place is at present in the hands of the English.

GOOGINGS, in sea-language, are clamps of iron bolted on the stern-post of a ship, whereon to hang the rudder and keep it steady: for which purpose there is a hole in each of them, to receive a correspondent spindle bolted on the back of the rudder, which turns thereby as upon hinges.

GOOMPTY, a river of Hindoostan Proper, which rises in the Rohilla Country, and flowing S. E. by Lucknow and Jionpour, falls into the Ganges, a little below Benares.

GOOSE, in ornithology. See *ANAS*. The goose was held in great esteem among the Romans, for having saved the Capitol from the invasion of the Gauls by cackling and clapping its wings. Geese were kept in the temple of Juno; and the censors, when they entered upon their office, provided meat for them. There was also an annual feast at Rome, at which they carried a silver image of a goose in state; and hanged a dog, to punish that animal because he did not bark at the arrival of the Gauls.

GOOSE-Ander, in ornithology. See *MERGUS*.

GOOSE-Berry, in botany. See *RIBES*.

GOOSE-Neck, in a ship, a piece of iron fixed on the one end of the tiller, to which the laniard of the whip-staff or the wheel-rope comes, for steering the ship.

GOOSE-Wing, in the sea-language. When a ship sails before, or with a quarter-wind on a fresh gale, to make the more haste, they launch out a boom and sail on the lee-side; and a sail so fitted is called a *goose-wing*.

GOOTY, or *GURTI*, a strong fortress in the peninsula of Hindoostan, formerly the seat of government of Morari Row, a Mahratta prince. It is now subject to Tippoo Sultan, regent of Mysore, and lies beyond the river Pennar, 25 miles S. by E. of Adoni. E. lon. 77. 35. N. lat. 15. 15.

GORCUM, a town of the United Provinces, in S. Holland, which carries on a considerable trade in cheese and butter. It is seated on the rivers Linghe and Maese, 12 miles E. of Dordrecht, and 32 S. of Amsterdam. E. lon. 4. 51. N. lat. 51. 51.

GORDIANUS I. (a Roman general), was for his valour and virtues chosen emperor by the army in the reign of Maximinus, A. D. 237; but his son, whom he had associated with himself in the throne, being slain by Capellian, the governor of Mauritania for Maximinus, Gordianus killed himself the same year. See **ROME**.

GORDIANUS III. (grandson of the former), a renowned warrior, and styled *The guardian of the Roman commonwealth*. He was treacherously assassinated by Philippus, an Arabian, one of his generals; who, to the eternal disgrace of the Romans of that era, succeeded him in the empire, Anno Domini 244.

GORDIAN-KNOT, in antiquity, a knot made in the leathers or harness of the chariot of Gordius king of Phrygia, so very intricate, that there was no finding where it began or ended. The inhabitants had a tradition, that the oracle had declared, that he who untied this knot should be master of Asia. Alexander, having undertaken it, was unable to accomplish it; when, fearing lest his not untying it should be deemed an ill augury, and prove a check in the way of his conquests, he cut it asunder with his sword, and thus either accomplished or eluded the oracle.

GORDIUS, the **HAIR-WORM**, a genus of insects belonging to the class of *vermes intestina*. There are several species, 1. The *aquaticus*, or water hair-worm, is 10 or 12 inches in length, and of about the thickness of a horse hair: its skin is smooth and somewhat glossy, without furrows: its colour pale yellowish white all over, except the head and tail, which are black and glossy. The body is rounded, and very slender in proportion to its length: the mouth is small, and placed horizontally; the jaws are both of the same length, and obtuse at their extremities. This species is common in our fresh waters, more especially in clay, through which it passes as a fish does through the water, and is the author of many springs. This is the worm that in Guinea and in some other of the hot countries gets into the flesh of the natives, and occasions great mischief; with us, though frequent enough in water where people bathe, it never attempts this.—2. The *argillaceus*, or clay hair-worm, is only a variation of the preceding one in colour, being yellowish at the extremities. It chiefly inhabits the clay; and Linnaeus calls that its proper element, from its being generally dug out of it.—3. The *medicinis*, or muscular hair-worm, is all over of a pale yellowish colour. It is a native of both Indies; frequent in the morning dew, from whence it enters the naked feet of the slaves, and occasions a disease much known in those countries, and to which children are very liable: it creates the most troublesome itchings, and too often excites a fever and inflammation. It particularly attacks the muscles of the arms and legs, from whence it may be drawn out by means of a piece of silk or thread tied round the head: but the greatest caution is necessary in this simple operation, lest the animal, by being strained too much, should break; for if any part remains under the skin, it quickly grows with redoubled vigour, and becomes a cruel, and sometimes fatal enemy to the poor slaves in particular. Baths with infusions of bitter plants, and all vermifuges, destroy it. 4. The *marinus* or sea hair-worm is filiform, twisted spirally and lying flat, about half an inch in length; of a whitish colour, smooth, and scarcely diminishing at the head. It is as great a tormentor of herrings, bleaks, and various other fish, as the *gordius medicinis* is of man. The fish when infested with these animals rise to the surface, and tumble about as if in great agony. See plate 15. Vol. iii.

GORDIUS, king of Phrygia, and father of Midas, was a poor husbandman, with two yokes of oxen, wherewith he ploughed his land and drew his wain. An eagle sitting a long while upon one of his oxen, he consulted the soothsayers. A virgin bid him sacrifice to Jupiter in the capacity of a king. He married

the virgin, who brought forth Midas. The Persians, instructed by the oracle to set the first person they met in a wain upon the throne, met Gordius, and made him king. Midas, for this good fortune, dedicated to Jupiter his father's cart. The knot of the yoke, they say, was so well twisted, that he who could unloose it was promised the empire of Asia; hence the proverb of *the Gordian knot* had its original. See **GORDIAN KNOT**.

GORDON (Alexander), an excellent draughtsman and a good Grecian, who resided many years in Italy, visited most parts of that country, and had also travelled into France, Germany, &c. was secretary to the Society for Encouragement of Learning; and afterwards to the Egyptian Club, composed of gentlemen who had visited Egypt (viz. Lord Sandwich, Dr. Shaw, Dr. Pococke, &c.). He succeeded Dr. Stukely as secretary to the Antiquarian Society, which office he resigned in 1741 to Mr. Joseph Ames. He went to Carolina with governor Glen, where, besides a grant of land, he had several offices, such as register of the province, &c.; and died a justice of the peace, leaving a handsome estate to his family. He published, 1. *Itinerarium Septentrionale*, or a Journey through most parts of the Counties of Scotland, in two parts, with 66 copperplates, 1726, folio. 2. Supplement to the *Itinerarium*, 1732, folio. 3. The Lives of Pope Alexander VI. and his son Cæsar Borgia. 4. A complete History of the ancient Amphitheatres, 1730, 8vo. afterwards enlarged in a second edition. 5. An Essay towards explaining the hieroglyphical figures on the Coffin of the ancient Mummy belonging to Capt. William Lethieuller, 1737, folio, with cuts. 6. Twenty-five Plates of all the Egyptian Mummies and other Egyptian Antiquities in England, 1739, folio.

GORDON (Thomas), noted for his translations and political writings, was born at Kirkcudbright in North Britain. He came young to London, where he supported himself by teaching languages, until he procured employment under the earl of Oxford in queen Anne's time, but in what capacity is not known. He first distinguished himself in the defence of Dr. Hoadley in the Bangorian controversy; which recommended him to Mr. Trenchard, in conjunction with whom he wrote the well-known Cato's Letters, upon a variety of important public subjects. These were followed by another periodical paper, under the title of the Independent Whig; which was continued, some years after Mr. Trenchard's death, by Gordon alone, against the hierarchy of the church, but with more acrimony than was shown in Cato's Letters. At length Sir Robert Walpole retained him to defend his administration, to which end he wrote several pamphlets. At the time of his death, July 28th, 1750, he was first commissioner of the wine-licences, an office which he had enjoyed many years. He was twice married. His second wife was the widow of his great friend Trenchard, by whom he had children. He published English translations of Sallust and Tacitus, with additional discourses to each author, which contain much good matter. Also two collections of his tracts have been preserved: the first intitled, A Cordial for Low-Spirits, in three volumes; and the second, The Pillars of Priestcraft and Orthodoxy shaken, in two volumes. But these, like many other posthumous things, had better have been suppressed. In his translation as well as his other works, he places the verbs at the ends of sentences, according to the Latin idiom, in a very stiff and affected manner.

GORDONIA, in botany; a genus of the polyandria order, belonging to the monadelphia class of plants. The calyx is simple; the style five-cornered, with the stigma quinquesfid; the capsule quincloocular; the seeds two-fold with a leaty wing. This is a tall and very straight tree, with a regular pyramidal head. Its leaves are shaped like those of the common bay, but serrated. It begins to blossom in May, and continues bringing forth its flowers the greatest part of the summer. The

flowers are fixed to foot-stalks, four or five inches long; are monopetalous, divided into five segments, encompassing a tuft of stamina headed with yellow apices; these flowers, in November, are succeeded by a conic capsula, having a divided calyx. The capsula, when ripe, opens and divides into five sections, disclosing many small half-winged seeds. This tree retains its leaves all the year, and grows only in wet places and usually in water. The wood is somewhat soft; yet Mr. Catesby mentions his having seen some beautiful tables made of it. It grows in Carolina, but not in any of the more northern colonies.

GORe, in heraldry, one of the abatements, which, according to Guillim, denotes a coward. It is a figure consisting of two arch lines, drawn one from the sinister chief, and the other from the sinister base, both meeting in an acute angle in the middle of the fess point. See HERALDRY.

GOReE, a small island of Africa, near Cape de Verd, subject to the French. It is barren, but of great importance on account of its good trade. W. lon. 17. 25. N. lat. 14. 40.

GOReE, a capital town of the island of the same name, in Holland, 8 miles S. S. W. of Briel. E. lon. 4. 20. N. lat. 51. 44.

GORe Island, an island in the N. Pacific Ocean, so named by Captain Cook, who discovered it in his last voyage. It appears to be barren and uninhabited. It lies in about lon. 169. W. lat. 64. N.

GORGE, in architecture, the narrowest part of the Tuscan and Doric capitals, lying between the astragal, above the shaft of the pillar, and the annulets.

GORGE, in fortification, the entrance of the platform of any work. See FORTIFICATION.

GORGED, in heraldry, the bearing of a crown, coronet, or the like, about the neck of a lion, a swan, &c. and in that case it is said, the lion or cygnet is gorged with a ducal coronet, &c. This term is also used when the gorge or neck of a peacock, swan, or the like bird, is of a different colour or metal from the rest.

GORGET, a kind of breast-plate like a half-moon, with the arms of the prince thereon, worn by the officers of the army. They are either gilt or silver, according to the colour of the buttons on the uniform.

GORGET, or GORGERET, in surgery, is the name which the French give to the concave or canulated conductor, used in lithotomy. See SURGERY.

GORGONA, a small island of Italy, in the sea of Tuscany, about eight miles in circumference, remarkable for the large quantity of anchovies taken near it. E. lon. 10. 0. N. lat. 43. 22.

GORGONA, an island of the South Sea, 12 miles W. of the coast of Peru. It is high land, very woody, and some of the trees are tall, large, and proper for masts. It is 10 miles in circumference, and has several rivulets of excellent water. There are a great number of monkeys, Guinea-pigs, lions, lizards, and sloths remarkable for their ugliness and the slowness of their motions, though by the shape they seem to be of the monkey kind. W. lon. 77. 50. S. lat. 3. 20.

GORGONIA, in natural history, a genus of zoophytes, which formerly were called *ceratophytens*, and are known in English by the names of *sea-fans*, *sea feathers*, and *sea-whips*. Linnaeus and Dr. Pallas consider them as of a mixed nature in their growth, between animals and vegetables; but Mr. Ellis shows them to be true animals of the polype kind, growing up in a branched form resembling a shrub, and in no part vegetable. They differ from the fresh-water polype in many of their qualities, and particularly in producing from their own substance a hard and solid support, serving many of the purposes of the bone in other animals. This is formed by a concreting juice,

thrown out from a peculiar set of longitudinal parallel tubes, running along the internal surface of the fleshy part: in the coats of these tubes are a number of small orifices, through which the ossaceous liquor exudes, and, concreting, forms the layers of that hard part of the annular circles, which some, judging from the consistence rather than the texture, have erroneously denominated *wood*. The surface of the gorgonia is composed of a kind of scales, so well adapted to each other, as to serve for defence from external injuries: and the flesh, or, as some have called it, the *bark* or *cortex*, consists of proper muscles and tendons for extending the opening of their cells; for sending forth from thence their polype suckers in search of food; and for drawing them in suddenly, and contracting the sphincter muscles of these starry cells, in order to secure these tender parts from danger; and also of proper secretory ducts, to furnish and deposit the ossaceous matter that forms the stem and branches as well as the base of the bone. Mr. Ellis affirms, that there are ovaries in these animals, and thinks it very probable that many of them are viviparous. See CORALLINES.

GORGONS, in antiquity and mythology. Authors are not agreed in the account they give of the Gorgons. The poets represent them as three sisters, whose names were *Stheno*, *Euryale*, and *Medusa*; the latter of whom was mortal, and, having been deslowered by Neptune, was killed by Perseus; the two former were subject neither to age nor death. They are described with wings on their shoulders, with serpents round their heads, their hands were of brass, and their teeth of a prodigious size, so that they were objects of terror to mankind. After the death of Medusa, her sisters, according to Virgil, were appointed to keep the gate of the palace of Pluto.

Multaque praterea variarum monstra ferarum—
GORGONES, *Harpeiceque*—

Diodorus Siculus will have the Gorgons and Amazons to have been two warlike nations of women, who inhabited that part of Libya which lay on the lake Tritonidis. The extermination of these female nations was not effected till Hercules undertook and performed it.

Pausanias says the Gorgons were the daughters of Phorbus; after whose death Medusa his daughter reigned over the people, dwelling near the lake Tritonidis. The queen was passionately fond of hunting and war, so that she laid the neighbouring countries quite waste. At last, Perseus having made war on them and killed the queen herself, when he came to take a view of the field of battle he found the queen's corpse so extremely beautiful, that he ordered her head to be cut off, which he carried with him to show his countrymen the Greeks, who could not behold it without being struck with astonishment. Others represent them as a kind of monstrous women, covered with hair, who lived in woods and forests. Others again make them animals, resembling wild sheep, whose eyes had a poisonous and fatal influence.

GORITIA, or GORITE, a strong town of Germany, in the circle of Austria, and duchy of Carniola, with a castle; seated on the river Lizonzo, 16 miles north-east of Aquileia, and 66 north-east of Venice. E. lon. 13. 43. N. lat. 46. 12.

GORLÆUS (Abraham), an eminent antiquary, was born at Antwerp, and gained a reputation by collecting medals and other antiques. He was chiefly fond of the rings and seals of the ancients, of which he published a prodigious number in 1601, under this title, *Dactyliotheca; sive Annulorum Sigillarium, quorum apud priscos tam Græcos quam Romanos usus ex ferro, ære, argento, et auro, Promptuarium*. This was the first part of the work: the second was intitled, *Variarum Gemmarum, quibus antiquitas insignando uti solita sculpturæ*. This work has undergone several editions, the best of which is that of Leyden, 1695; for it not only contains a vast number of cuts,

but also a short explication of them by Gronovius. In 1608 he published a collection of medals: which however, if we may believe the *Scaligerana*, it is not safe always to trust. Gorlaeus pitched upon Delft for the place of his residence, and died there in 1609. His collections of antiques were sold by his heirs to the prince of Wales.

GORLITZ, a town of Germany in Upper Lusatia, subject to the elector of Saxony. It is a handsome strong place, and seated on the river Neisse, in E. lon. 15. 15. N. lat. 51. 10.

GORTERIA, in botany; a genus of the polygamia frustranea order, belonging to the syngenesia class of plants, and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked; the pappus woolly; the florets of the radius ligulated or plane; the calyx imbricated with spinous scales.

GOSHAWK. See FALCO.

GOSLAR, a large and ancient town of Lower Saxony, and in the territory of Brunswick; it is a free imperial city, and it was here that gunpowder was first invented, by a monk as is generally supposed. It is a large place, but the buildings are in the ancient taste. In 1728, 280 houses and St. Stephen's fine church were reduced to ashes. It is seated on a mountain near the river Gose, and near it are rich mines of iron. The inhabitants are famous for brewing excellent beer. E. lon. 3. 37. N. lat. 51. 55.

GOSPEL, the history of the life, actions, death, resurrection, ascension, and doctrine of Jesus Christ. The word is Saxon, and of the same import with the Latin term *evangelium*, which signifies glad tidings, or good news. The history is contained in the writings of St. Matthew, St. Mark, St. Luke, and St. John, who from thence are called *evangelists*. The Christian church never acknowledged any more than these four gospels as canonical; notwithstanding which, several apocryphal gospels are handed down to us, and others are entirely lost.

GOSPORT, a town of Hampshire, 79 miles from London, in the parish of Alverstock. It has a ferry over the mouth of the harbour to Portsmouth, and is a large town and of great trade, especially in time of war. Travellers choose to lodge here, where every thing is cheaper and more commodious for them than at Portsmouth. The mouth of the harbour, which is not so broad here as the Thames at Westminster, is secured on this side by four forts, and a platform of above 20 cannon level with the water. Here is a noble hospital built for the cure of the sick and wounded sailors in the service of the navy; besides a free school.

GOSSAMER is the name of a fine filmy substance, like cobweb, which is seen to float in the air in clear days in autumn, and is more observable in stubble-fields, and upon furze and other low bushes. This is probably formed by the flying-spider, which, in traversing the air for food, shoots out these threads from its anus, which are borne down by the dew, &c.

GOSSYPIUM, or COTTON; a genus of the polyandria order, belonging to the monadelphia class of plants, and in the natural method ranking under the 37th order, *Columnifera*. The calyx is double, the exterior one tritid; the capsule quadrilocular; the seeds wrapt in cotton-wool. There are four species, all of them natives of warm climates. 1. The *herbaceum*, or common herbaceous cotton, hath an herbaceous smooth stalk two feet high, branching upwards; five-lobed smooth leaves; and yellow flowers from the ends of the branches, succeeded by roundish capsules full of seed and cotton. 2. The *hirsutum*, or hairy American cotton, hath hairy stalks branching laterally two or three feet high; palmated, three and five-lobed hairy leaves; and yellow flowers, succeeded by large oval pods furnished with seeds and cotton. 3. The *barbadense*, or Barbadoes shrubby

cotton, hath a shrubby stalk branching four or five feet high, three-lobed smooth-leaves, glandulous underneath; and yellow flowers succeeded by oval pods, containing seeds and cotton. 4. The *arboresum*, or tree cotton, has an upright woody perennial stalk, branching six or eight feet high; palmated, four or five-lobed smooth leaves, and yellow flowers, succeeded by large pods filled with seeds and cotton. The first three species are annual, but the fourth is perennial both in root and stalk. In warm countries these plants are cultivated in great quantities in the fields for the sake of the cotton they produce; but the first species is most generally cultivated. The pods are sometimes as large as middling-sized apples, closely filled with the cotton surrounding the seed. When these plants are raised in this country, they must be continually kept in a warm stove, where they will produce seeds and cotton. They are propagated by seeds. See COTTON.

The American Islands produce cotton shrubs of various sizes, which rise and grow up without any culture, especially in low and marshy grounds. Their produce is of a pale red; some paler than others; but so short that it cannot be spun. None of this is brought to Europe, though it might be usefully employed in making of hats. The little that is picked up serves to make mattresses and pillows.

The cotton-shrub that supplies our manufactures requires a dry and stony soil, and thrives best in grounds that have already been tilled. Not but that the plant appears more flourishing in fresh lands than in those which are exhausted; but while it produces more wood, it bears less fruit. A western exposure is fittest for it. The culture of it begins in March and April, and continues during the first spring-rains. Holes are made at seven or eight feet distance from each other, and a few seeds thrown in. When they are grown to the height of five or six inches, all the stems are pulled up, except two or three of the strongest. These are cropped twice before the end of August. This precaution is the more necessary, as the wood bears no fruit till after the second pruning; and, if the shrub was suffered to grow more than four feet high, the crop would not be the greater, nor the fruit so easily gathered. The same method is pursued for three years; for so long the shrub may continue, if it cannot conveniently be renewed oftener with the prospect of an advantage that will compensate the trouble. This useful plant will not thrive if great attention is not paid to pluck up the weeds that grow about it. Frequent rains will promote its growth: but they must not be incessant. Dry weather is particularly necessary in the months of March and April, which is the time of gathering the cotton, to prevent it from being discoloured and spotted. When it is all gathered in, the seeds must be picked out from the wool with which they are naturally mixed. This is done by means of a cotton-mill; which is an engine composed of two rods of hard wood, about 18 feet long, 18 lines in circumference, and fluted two lines deep. They are confined at both ends, so as to leave no more distance between them than is necessary for the seed to slip through. At one end is a kind of little millstone, which, being put in motion with the foot, turns the rods in contrary directions. They separate the cotton, and throw out the seed contained in it.

GOTHA, a town of Germany, in the circle of Upper Saxony, and capital of a duchy of the same name. It is 18 miles W. of Erfurt. Lon. 10. 52. E. Lat. 51. 0. N.

GOTHA, a river of W. Gothland in Sweden, which issues out of lake Wenner, and falls into the North Sea at Gothenborg.

GOTHARD, one of the highest mountains of Switzerland; and from the top, where there is an hospital for monks, is one of the finest prospects in the world. It is eight miles from Aldorf.

GOTHEBORG, or GOTTENBURG, a rich and flourishing

town of W. Gothland in Sweden, seated at the mouth of the river Gotha, which forms an excellent harbour; and it is the best situated for foreign trade of any in the kingdom, as it lies without the Sound. The inhabitants are computed to be 20,000. Here is a considerable herring fishery; and from this port the Swedish E. India ships take their departure. The fortifications of this town are so weak, that the Danes, who attacked the Swedes in 1788, under the pretence of an alliance with Russia, must have taken it, with the king of Sweden in person, but for the interference of Mr. Elliot, the British minister, under whose mediation an armistice, and afterward a convention, were concluded between the two contending powers. Gotheborg is 188 miles S. W. of Stockholm. Lon. 11. 44. E. Lat. 57. 42. N.

GOTHIC, in general, whatever has any relation to the Goths: thus we say, Gothic customs, Gothic architecture, &c. See ARCHITECTURE.

GOTHLAND, one of the five general divisions of the kingdom of Sweden, containing the provinces of Ostrogothia or E. Gothland, Smoland, Westrogothia or W. Gothland, the isles of Gothland and Oeland, Wermland, Dalia, Halland, Blekingen, and Scania or Schonen.

GOTHS, a warlike nation, and above all others famous in the Roman history, came originally out of Scandinavia (the name by which the ancients distinguished the present countries of Sweden, Norway, Lapland, and Finmark). According to the most probable accounts, they were the first inhabitants of those countries; and from thence sent colonies into the islands of the Baltic, the Cimbric Cheronesus, and the adjacent places yet destitute of inhabitants. The time of their first settling in Scandinavia, and the time when they first peopled with their colonies the abovementioned islands and Cheronesus, are equally uncertain; though the Gothic annals suppose the latter to have happened in the time of Serug the great grandfather of Abraham. This first migration of the Goths is said to have been conducted by their king Eric; in which all the ancient Gothic chronicles, as well as the Danish and Swedish ones, agree. Their second migration is supposed to have happened many ages after; when, the abovementioned countries being overstocked with people, Berig, at that time king of the Goths, went out with a fleet in quest of new settlements. He landed in the country of the Ulmerugians, now Pomerania, drove out the ancient inhabitants, and divided their lands among his followers. He fell next upon the Vandals, whose country bordered on that of the Ulmerugians, and overcame them; but instead of forcing them to abandon their country, he only made them share their possessions with the Goths.

The Goths who had settled in Pomerania and the adjacent parts of Germany being greatly increased, inasmuch that the country could no longer contain them, they undertook a third migration in great numbers, under Filimer surnamed the Great, their fifth prince after leaving Scandinavia; and taking their route eastward, entered Scythia, advanced to the Cimmerian Bosphorus, and, driving out the Cimmerians, settled in the neighbourhood of the Palus Maeotis. Thence in process of time, being greatly increased in Scythia, they resolved to seek new settlements; and, accordingly taking their route eastward, they traversed several countries, and at length returned into Germany.

Their leader in this expedition was the celebrated Woden, called also *Voden*, *Othen*, *Oden*, *Godan*, and *Guadan*. Of this Woden many wonderful things are related in the Sueo-gothic chronicles. He was king of the Asgardians, whom the northern writers will have to be the same with a people called *Aspurgians* mentioned by Strabo and Ptolemy. By Strabo they are placed near the Cimmerian Bosphorus. Aspurgia was the metropolis of a province which Strabo calls *Asia*; and Woden and his followers

are styled by the ancient Gothic writers *Asæ*, *Asianæ*, and *Asiotæ*. The kings of Aspurgia were masters of all that part of Scythia which lay to the westward of Imaus, and was by the Latins called *Scythia intra Imaum*, or "Scythia within Imaus."

At what time Woden reigned in this country, is quite uncertain; but all historians agree, that he went out in quest of new settlements with incredible numbers of people following him. He first entered Roxolania, comprehending the countries of Prussia, Livonia, and great part of Muscovy. From thence he went by sea into the north parts of Germany; and having reduced Saxony and Jutland, he at last settled in Sweden, where he reigned till his death, and became so famous that his name reached all countries, and he was by the northern nations worshipped as a god. He is supposed to have brought with him the Runic characters out of Asia, and to have taught the northern nations the art of poetry; whence he is styled the father of the Scaldi or Scaldri, their poets, who described in verse the exploits of the great men of their nation, as the bards did among the Gauls and Britons.

The Romans distinguished the Goths into two classes; the Ostrogoths and Visigoths. These names they received before they left Scandinavia, the *Visigoths* being softened by the Latins from *Westrogoths*, or those who inhabited the western parts of Scandinavia, as the Ostrogoths were those who inhabited the eastern part of that country. Their history affords nothing of moment till the time of their quarrelling with the Romans; which happened under the reign of the emperor Caracalla, son to Severus. After that time their history becomes so closely interwoven with that of the Romans, that for the most remarkable particulars of it we must refer to the histories of Rome. After the destruction of the Roman empire by the Heruli, the Ostrogoths, under their king Theodoric, became masters of the greatest part of Italy, having overcome and put to death Odoacer, king of the Heruli, in 494. They retained their dominion in this country till the year 553; when they were finally conquered by Narfes, the emperor Justinian's general. The Visigoths settled in Spain in the time of the emperor Honorius, where they founded a kingdom which continued till the country was subdued by the Saracens.

The Goths were famous for their hospitality and kindness to strangers, even before they embraced the Christian religion. Nay, it is said, that, from their being eminently good, they were called *Goths* by the neighbouring nations; that name, according to Grotius and most other writers, being derived from the German word *guten*, which signifies "good." They encouraged, says Dio, the study of philosophy above all other barbarous or foreign nations, and often chose kings from among their philosophers. Polygamy was not only allowed but countenanced among them; every one being valued or respected according to the number of his wives. By so many wives they had an incredible number of children, of whom they kept but one at home, sending out the rest in quest of new settlements; and hence those swarms of people which overran so many countries. With them adultery was a capital crime, and irremissibly punished with death. This severity, and likewise polygamy, prevailed among them when they were known to the Romans only by the name of *Getes* (their most ancient name); as appears from the poet Menander, who was himself one of that nation; and from Horace, who greatly commends the chastity of their women. Their laws fell little short of those of the ancient Romans. Their government was monarchical; their religion was much the same with that of the ancient Germans or Celtes; and their dress is described by Apollinaris Sidonius in the following words: "They are shod (says he) with high shoes made of hair, and reaching up to their ankles; their knees, thighs, and legs, are without any covering; their garments

of various colours scarce reaching to the knee ; their sleeves only cover the top of their arms ; they wear green calsocks with a red border ; their belts hang on their shoulder ; their cars are covered with twisted locks ; they use hooked lances and missile weapons."

GOTHOFRED, or GODFREY, (Denis or Dionysius), an eminent civil lawyer, born of an illustrious house at Paris, in 1549. Finding his country involved in the confusion of the leaguers, he accepted of a professor's chair at Geneva, until he was patronized and employed by Henry IV. ; but being afterwards stripped of his employments as a huguenot, he at length retired to Heidelberg, from whence no offers were able to detach him. He was, however, disappointed of his intention to end his days there : for the disturbances that broke out in the Palatinate obliged him in 1621 to take refuge in Strasburg, where he died the following year. He wrote a great number of books ; but his principal work is the *Corpus Juris Civilis, cum notis*.

GOTHOFRED (Theodore), son of the former, was born at Geneva in 1580. As soon as he had finished his studies, he went to Paris ; where he conformed to the Romish religion, and applied with indefatigable industry to the study of history, that of France particularly, wherein he became very eminent, as appears by his works. In 1632 the king made him one of his historiographers, with a stipend of 3000 livres ; and in 1636 he was sent to Cologne, to assist at the treaty of peace negotiating there, on the part of France, by the cardinal of Lyons. This treaty being removed to Munster, Gothofred was sent thither, where he drew up Memoirs on the subject ; and continued in that city, in the king's service, to his death in 1649. His principal work is his "Account of the Ceremonial of the Kings of France."

GOTHOFRED (James), brother of the preceding, was born at Geneva in 1587. Applying himself to the study of the law, he obtained the professor's chair there, was made counsellor of the city, and was several times employed in France, Germany, Piedmont, and Switzerland, to negotiate their affairs in the name of the republic. He died in 1562 ; and his chief work is his *Codex Theodosianus, cum perpetuis commentariis, &c.*

GOTHOFRED (Denis), son of Theodore above mentioned, was born at Paris in 1615. He studied history after his father's example, became as eminent in that department of knowledge, and obtained the reversion of his father's place of historiographer royal, from Louis XIII. when he was but 25 years of age. He published his father's *Ceremonial of France* ; finished his *Memoirs of Philip de Commines* ; and was preparing a *History of Charles VIII.* when he died in 1681. It was published by his eldest son Denis in 1684.

GOTTENBURG. See GOTTENBORG.

GOTTINGEN, a considerable town of Lower Saxony in Germany, and in the duchy of Brunswick ; formerly free and imperial, but now subject to the elector of Hanover. Here his late Majesty George II. founded an university. It is seated on the river Leine, in E. lon. 10. 5. N. lat. 51. 32.

GOTTORP, a town of Denmark, in the duchy of Sleswick, capital of the duchy of Holstein Gottorp, where the ducal palace is very fine. Lon. 9. 56. E. Lat. 54. 36. N.

GOUANIA, in botany ; a genus of the monœcia or ler, belonging to the polygamia class of plants. The calyx of the hermaphrodite is quinquefid ; there is no corolla ; there are five antheræ covered with an elastic calyptra or hood ; the style trifid ; the fruit, inferior to the receptacle of the flower, divisible into three seeds. The male is like the hermaphrodite, but wanting stigma and germens.

GOUDA, or TURGOW, a considerable town of South Holland, Vol. IV.

in the United Provinces, remarkable for its stately church. It is seated on the river IJssel, 8 miles N. E. of Rotterdam, in E. lon. 4. 41. N. lat. 51. 8.

GOUDT (Henry), usually called *Count Goudt*, was born of a noble family at Utrecht in 1570, and was a knight of the Palatinate. Being passionately fond of the arts, particularly painting and engraving, and desirous of engaging in them, he applied himself diligently to drawing, and made a great proficiency therein. He went to Rome to examine the works of the great masters in that city. Here he contracted an intimacy with that excellent artist Adam Elsheimer ; studied his manner of penciling, designing, and colouring ; and made his works models for his own imitation. He pre-engaged all the pictures that his friend and favourite could finish, and even paid liberally for them before-hand ; by which means he found himself in possession of a most desirable treasure. Those pictures which Goudt himself painted were neatly and delicately touched, in colour and pencil resembling Elsheimer, though they were in no degree equal to the paintings of that admirable master. On his return to his native country, a young woman who was in love with him, and desirous of marrying him, it is said, gave him in his drink a love philtre ; which, however, terminated in a very melancholy manner, by depriving him totally of his senses ; and in the dreadful state of idiotism he dragged on a miserable life to the age of 69, his death happening in 1639. It is remarkable, that though lost to every other subject, when painting was spoken of he would discourse upon it in a very rational manner.

Goudt practised engraving as well as painting, and made seven beautiful prints after the pictures of Elsheimer, which are well known to the curious, and are to be met with in most choice collections. He worked with the graver only, in a very neat style ; and produced a most powerful effect, not by strengthening the strokes, according to the usual method, but by crossing them with additional strokes, equally neat, and that five or six times, one over another, in the deep shadows. Considering the precision with which he executed his engravings, the freedom of handling the graver which may be discovered in them is very astonishing. The weeds and other parts of the fore-ground in that admirable print of the Ceres are very finely expressed. The heads of the figures are correctly drawn, and the other extremities are managed in a judicious manner. The seven prints done by him from Elsheimer, mentioned above, are, 1. Ceres drinking from a pitcher. An old woman appears holding a candle at the door of the cottage, and a boy naked standing by her is laughing and pointing at the goddess ; for which contempt he was metamorphosed by her into a frog. The powerful and striking effect of this engraving cannot be properly described. This print is distinguished also by the name of the *servery*. 2. The flight into Egypt : A night-scene, in which the moon and stars are introduced with great success. 3. The angel with Tobit, who is drawing a fish by his side. The back-ground is a landscape ; the weeds in the foreground, and the branches of the trees in front, as well as the foliage and weeds hanging from them, are beautifully expressed. 4. The angel with Tobit, crossing a stream of water : The back ground, a landscape. 5. Baucis and Philemon entertaining Jupiter and Mercury. 6. A landscape, called the *Aurora*, representing the dawn of day. The effect is very beautiful. 7. The beheading of St. John in prison, a very small upright oval print, which is by far the rarest.

GOVERNMENT, in general, is the polity of a state, or an orderly power constituted for the public good. Civil government was instituted for the preservation and advancement of men's civil interests, and for the better security of their lives, li

erties, and property. The use and necessity of government is such, that there never was an age or country without some sort of civil authority: but as men are seldom unanimous in the means of attaining their ends, so their difference in opinion in relation to government has produced a variety of forms of it. To enumerate them would be to recapitulate the history of the whole earth. But, according to Montesquieu and most other writers, they may in general be reduced to one of these three kinds. 1. The republican. 2. The monarchical. 3. The despotic. The first is that, where the people in a body, or only a part of the people, have the sovereign power; the second, where one alone governs, but by fixed and established laws; but in the despotic government, one person alone, without law and without rule, directs every thing by his own will and caprice. See the article LAW. The subject of government was, perhaps, never so much the subject of discussion as at present; the French Revolution and the writings of Mr. Burke and Thomas Paine, having rendered the enquiry into the comparative merits of monarchical and republican forms of government universal. The possible evils of the former are the result of experiment, and admit of a remedy by a judicious limitation. The latter is a form fraught with great apparent benefits to the people, but it has, nevertheless, the great disadvantage of never having undergone the test of experiment; a circumstance that should make men careful how they adopt it in preference even to a form of government confessedly not free from objections. On the subject of government at large, see Montesquieu's *L'Esprit des Loix*, l. 2. c. 1.; Locke, ii. 129, &c. quarto edition, 1768; Sidney on Government; Sir Thomas Smith's *de Repub. Angl.*; and Archerly's *Britannic Constitution*. As to the Gothic government, its original, and faults, &c. see Montesquieu's *L'Esprit des Loix*, l. 11. c. 8. With respect to the feudal policy, how it limited government, see *FEUDAL System*.

GOVERNMENT is also a post or office, which gives a person the power or right to rule over a place, a city, or a province, either supremely or by deputation.

GOVERNMENT is likewise used for the city, country, or place in which the power of governing is exercised.

GOUGE, an instrument used by various artificers, being a sort of round hollow chisel; serving to cut holes, channels, grooves, &c. in wood, stone, &c.

GOULART (Simon), a famous minister of Geneva, was born at Senlis in 1543, and was one of the most indefatigable writers of his time. He made considerable additions to the Catalogue of Witnesses of the Truth, composed by Illyricus; and acquired a great reputation by his works; the principal of which are, 1. A translation of Seneca. 2. A collection of memorable histories. 3. A translation of St. Cyprian's *De lapsis*. 4. Several devotional and moral treatises. He died at Geneva in 1628.

GOURD, in botany. See CUCURBITA.

GOURGUES (Dominique de), an illustrious French patriot, a private gentleman of Gascony. The Spaniards having inhumanly massacred a colony of Frenchmen who had settled in Florida, Gourgues took a severe revenge on them, an account of which is given in the history of that place. On his return, he was received with acclamations by his countrymen, but was forbid to appear at court. Queen Elizabeth invited him to command an English fleet against the Spaniards in 1593; but he died at Tours in his way to England.

GOURNAY, a town of France, in the department of Lower Seine and late province of Normandy, remarkable for its market of fine butter. It is seated on the river Epte, 52 miles N. W. of Paris. Lon. o. 36. W. Lat. 49. 32. N.

GOURNAY (Mary de Jars de), a lady celebrated for her learn-

ing, was the daughter of William de Jars, lord of Neufvi and Gournay. After the death of her father, she was protected by Montaigne and Cardinal Richelieu. To the daughter of the former she dedicated her *Noségay of Pindus*; and composed several other works, the most considerable of which is *Les Avis*. She died at Paris in 1685, aged 80. The critics are divided concerning the reputation of this lady: by some she is styled the *Siren of France*; others say her works should have been buried with her.

GOUT. See MEDICINE.

GOWER (John), one of our most ancient English poets, was cotemporary with Chaucer, and his intimate friend. Of what family or in what country he was born is uncertain. He studied the law, and was some time a member of the society of Lincoln's-inn, where his acquaintance with Chaucer began. Some have asserted that he was a judge; but this is by no means certain. In the first year of Henry IV. he became blind; a misfortune which he laments in one of his Latin poems. He died in the year 1402, and was buried in St. Mary Overie, which church he had rebuilt chiefly at his own expence, so that he must have lived in affluent circumstances. His tomb was magnificent, and curiously ornamented. It still remains, but hath been repaired in later times. From the collar of SS. round the neck of his effigies, which lies upon the tomb, it is conjectured that he had been knighted. As to his character as a man, it is impossible, at this distance of time, to say any thing with certainty. With regard to his poetical talents, he was undoubtedly admired at the time when he wrote, though a modern reader may find it difficult to discover much harmony or genius in any of his compositions. He wrote, 1. *Speculum meditantis*, in French, in ten books. There are two copies of this in the Bodleian library. 2. *Vox clamantis*, in Latin verse, in seven books. Preserved also in the Bodleian library, and in that of All-Souls. It is a chronicle of the insurrection of the commons in the reign of Richard II. 3. *Confessio amantis*; printed at Westminster by Caxton in 1493. Lond. 1532, 1554. It is a sort of poetical system of morality, interspersed with a variety of moral tales. 4. *De rege Henrico IV.* Printed in Chaucer's works. There are likewise several historical tracts in manuscript, written by our author, which are to be found in different libraries; also some short poems printed in Chaucer's works.

GOWN, ROBE, a long upper garment, worn by lawyers, divines, and other graduates; who are hence called *men of the gown*, or *gownmen*. The gown is an ample sort of garment, worn over the ordinary clothes, hanging down to the feet. It is fashioned differently for ecclesiastics and for laymen. At Rome they gave the name "virile gown," *toga virilis*, to a plain kind of gown which their youth assumed when arrived at puberty. This they particularly denominated *prætexta*. See TOGA, PRÆTEXTA, &c.

"The remarkable drefs of our British ancestors (Mr. Whitaker observes in his History of Manchester, vol. 1. p. 302.), which continued very nearly the same to the commencement of the last century among the natives of Ireland, and has actually descended to the present among the mountaineers of Scotland, and is therefore rendered very familiar to our ideas, carried in it an astonishing appearance to the Romans. And it seems to have been equally the drefs of the men and women among the nobles of Britain. Put in a few years after the erection of the Roman-British towns in the north, and in the progress of refinement among them, this ancient habit began to be disesteemed by the chiefs of the cities, and looked upon as the badge of ancient barbarism. And the growing prejudices were soon so greatly improved, that within 20 years only after the construction of

the towns, the British sagum was actually resigned, and the Roman *toga* or gown assumed by many of them.

"The gown, however, never became universal in Britain: and it seems to have been adopted only by the barons of the cities and the officers of the crown; and has therefore been transmitted to us as the robe of reverence, the ensign of literature, and the mantle of magistracy. The woollen and plaided garments of the chiefs having naturally superseded the leathern vestures of their clients, the former were still worn by the generality of the Britons; and they were retained by the gentlemen of the country, and by the commonalty both in country and city. That this was the case appears evident from the correspondent conduct of the Gauls and Britons, who kept their *Virgata Sagula* to the last, and communicated them to the Franks and Saxons. The plaided drapery of the Britons still appeared general in the streets of Manchester; and must have formed a striking contrast to the gown of the chief, the dark mantle of Italy: and it and the ornamented buttons on the shoulder are preserved among us even to the present moment, in the parti-coloured clothing and the tasseled shoulder-knots of our footmen."

Gown is also taken in the general for civil magistrature, or the profession opposite to that of arms. In this sense it was that Cicero said *cedant arma togæ*.

GOYEN (John Van), painter of landscapes, cattle, and sea-pieces, was born at Leyden in 1596; and was for some time instructed by Isaac Nicolaï, who was reputed a good painter; but afterwards he became the disciple of Esaias Vandervelde, the most celebrated landscape painter of his time. Van Goyen very soon rose into general esteem; and his works are more universally spread through all Europe than the works of any other master, for he possessed an uncommon readiness and practice to sketch the views of villages and towns situated on the banks of rivers or canals; of the sea-ports in the Low Countries; and sometimes of inland villages, where the scenes around them appeared to him pleasing or picturesque. Those he afterwards used as subjects for his future landscapes; enriching them with cattle, boats, and figures in character, just as the liveliness of his imagination directed. He understood perspective extremely well, and also the principles of the *chiaro-scuro*; which branches of knowledge enabled him to give his pictures a strong and agreeable effect. He died in 1656, aged 60. His usual subjects were sea-pieces, or landscapes with views of rivers, enlivened with figures of peasants either ferrying over cattle, drawing their nets in still water, or going to or returning from market. Sometimes he represented huts of boors on the banks of rivers, with overhanging trees, and a beautiful reflexion of their branches from the transparent surface of the water. These were the subjects of his best time, which he generally marked with his name and the year; and the high-finished pictures of Van Goyen will be for ever estimable. But as he painted abundance of pictures, some are slight, some too yellow, and some negligently finished: though all of them have merit, being marked with a free, expeditious, and easy pencil, and a light touch. His pictures frequently have a greyish cast; which did not arise from any mismanagement of the tints, or any want of skill in laying on the colours; but was occasioned by his using a colour called *Hærlum blue*, much approved of at that time, though now entirely disused, because the artists found it apt to fade into that greyish tint; and it hath also rendered the pictures of this master exceedingly difficult to be cleaned without injuring the finer touches of the finishing. His best works are valued so highly in most parts of Europe, and especially in the Low Countries, that they deservedly afford large prices, being ranked in Holland with the pictures of Teniers; and at this time are not

easily procured, particularly if they are undamaged, though his slighter performances are sufficiently common.

GRAAF (Regnier de), a celebrated physician, born at Schoonhaven in Holland in 1641. Although he studied physic in Prussia, he was educated at Leyden, where he acquired great honour by publishing a treatise *De Succo Pancreatico*. He also published three pieces upon the organs of generation, both male and female; upon which subject he had a controversy with Swammerdam. He died young, in 1673; and his works, with his life prefixed, were published at Leyden in 1677, in 8vo.

GRABE (John Ernest), a very learned writer in the beginning of the 18th century, a native of Königsberg in Prussia. He was educated in the Lutheran religion; but the reading of the fathers led him into doubts. He presented to the electoral consistory at Sambia in Prussia a memorial containing his doubts. The elector gave orders to three eminent divines to answer them. Their answers shook him a little in his resolution of embracing the Roman Catholic religion; and one of them, Spener, advised him to go to England. He went; and king William gave him a pension, which was continued by queen Anne. He was ordained a priest of the church of England, and honoured with the degree of doctor of divinity by the university of Oxford; upon which occasion Dr. George Smalridge pronounced two Latin orations, which were afterwards printed. He wrote, 1. *Spicilegium S. S. Patrum, ut et Hereticorum sæculi post Christum nati*, 8vo. 2. An edition of the Septuagint, from the Alexandrian manuscript in St. James's library. 3. Notes on Justin, &c.; and other works, which are esteemed by the learned.

GRACCHUS (Tiberius), elected tribune of the Roman people, demanded in the senate, in their name, the execution of the Agrarian law; by which all persons possessing above 200 acres of land were to be deprived of the surplus, for the benefit of the poor citizens, amongst whom an equal distribution of them was to be made. Having carried his plan into execution by violent measures, he fell a victim to his zeal, being assassinated by his own party, 133 B. C. Caius his brother, pursuing the same steps, was killed by the consul Opimius, 121 B. C.

GRACE, among divines, is taken, 1. For the free love and favour of God, which is the spring and source of all the benefits we receive from him. 2. For the work of the Spirit renewing the soul after the image of God; and continually guiding and strengthening the believer to obey his will, to resist and mortify sin, and overcome it.

GRACE is also used, in a peculiar sense, for a short prayer said before and after meat. The proofs of the moral obligation of this ceremony, drawn from different passages of the New Testament, are well known. Some others, drawn from the practice of different nations, and of very remote antiquity, we shall introduce in this place.

1. Athenæus tells us, in his *Deipnosoph.* lib. ii. that in the famous regulation made by Amphictyon king of Athens with respect to the use of wine, both in sacrifices and at home, he required that the name of *Jupiter the Sustainer* should be decently and reverently pronounced. The same writer, in lib. iv. p. 149. quotes Hermias, an author extant in his time, who informs us of a people in Egypt, inhabitants of the city of Naucratis, whose custom it was on certain occasions, after they had placed themselves in the usual posture of eating at the table, to rise again and kneel; when the priest or precentor of the solemnity began to chant a grace, according to a stated form amongst them; and when that was over, they joined in the meal in a solemn sacrificial manner. Heliodorus has a passage in his *Æthiopics* to the same purpose, that it was the custom of the

Egyptian philosophers to pour out libations and put up ejaculations before they sat down to meals. Porphyry, in his treatise *De abstin.* lib. iv. p. 408. gives a great character of the Samnean gymnosophists in Egypt for the strictness of their life: as one article in their favour, he observes, that at the founding of a bell before their meals, which consisted only of rice, bread, fruits, and herbs, they went to prayers; which being ended, and not before, the bell sounded again, and they sat down to eating. In general this was a religious usage or rite amongst the ancient Greeks, and derived from yet older ages, if Clement of Alexandria rightly informs us. He mentions, that these people, when they met together to refresh themselves with the juice of the grape, sung a piece of music in imitation of the Hebrew psalms, which they called a *sebelion*. Livy, lib. xxxix. speaks of it as a settled custom among the old Romans, that they offered sacrifice and prayer to the gods at their meals and computations. But one of the fullest testimonies to our purpose is given by Quintilian, *Declam.* 301. *Adisti mensam*, says he, *ad quam cum venire cepimus, Deos invocamus*; "We approached the table (at supper together), and then invoked the gods."

The Jesuit Trigautius, in his very elegant and instructive narrative of the Christian expedition of their missionaries into China, book i. p. 69. gives this account of the people there in the particular now under consideration. "Before they place themselves for partaking of an entertainment, the person who makes it sets a vessel, either of gold, or silver, or marble, or some such valuable material, in a charger full of wine, which he holds with both his hands, and then makes a low bow to the person of chief quality or character at the table. Then, from the hall or dining-room, he goes into the porch or entry, where he again makes a very low bow, and, turning his face to the south, pours out this wine upon the ground as a thankful oblation to the Lord of heaven. After this, repeating his reverential obeisance, he returns into the hall," &c.

The Turks pray for a blessing on their meat; and many more instances might be produced of infidels who have constantly observed the like custom in some way or other.

2. The fact therefore, with respect to the heathen world, being thus evident, we proceed to the sentiments and behaviour of the Jews in this particular. Their celebrated historian Josephus, giving a detail of the rites and customs of the Essenes, who were confessedly the strictest and most pious professors of the Jewish religion, has this remarkable passage to the present purpose: "The priest," says he, "begs a blessing before they presume to take any nourishment; and it is looked upon as a great sin to take or taste before." Then follows the thanksgiving before meat: and "when the meal," proceeds he, "is over, the priest prays again; and the company with him bless and praise God as their preserver, and the donor of their life and nourishment."

Philo, in his book *De vita contemplativa*, gives an account of a body of men and women stricter than even the Essenes themselves. He distinguishes them by no particular name, though his relation is very accurate and circumstantial; namely, that on certain special occasions, before "they took their meals, they placed themselves in a proper decent order; when, lifting up their hands and eyes to heaven, they prayed to God that he would be pleased to be propitious to them in the use of those his good creatures."

From the Hebrew ritual it appears, that the Jews had their *hymns* and psalms of thanksgiving, not only after eating their *passover*, but on a variety of other occasions, at and after meals, and even between their several courses and dishes; as when the bet of their wine was brought upon the table, or their aromatic confections, or the fruit of the garden, &c. On the day of

the passover was sung Psalm cxiv. "When Israel came out of Egypt," &c.

Aristæus has a passage full on the present subject. "Moses," says he, "commands, that when the Jews are going to eat or drink, the company should immediately join in sacrifice or prayer." Where Rabbi Eleazar (upon that author) met with this sentence, has been controverted. But supposing it not to be found *in scriptis*, it is sufficient for us to know that the Jews did constantly practise this custom, upon the foundation of an ancient and general tradition and usage. That the prophet Daniel gave thanks before meat is evident from the Apocryphal book concerning Bel and the Dragon, where, ver. 38, 39. we find, that "Daniel said, Thou hast remembered me, O God! neither hast thou forsaken them who seek thee and love thee. So Daniel arose, and did eat." Of this text Prudentius takes notice in Cathem. hymn iv.

GRACE, or *Gracefulness*, in the human character; an agreeable attribute, inseparable from motion as opposed to rest, and as comprehending speech, looks, gesture, and loco-motion. In a word, grace may be defined, "that agreeable appearance which arises from elegance of motion and from a countenance expressive of dignity." Expressions of other mental qualities are not essential to that appearance, but they heighten it greatly. Of all external objects, a graceful person is the most agreeable. Dancing affords great opportunity for displaying grace, and haranguing still more. See DANCING, DECLAMATION, and ORATORY.

Act of GRACE, the appellation given to any act of parliament which allows prisoners for civil debts to be set at liberty, upon making oath that they have surrendered to their creditors their whole property, and have not wherewithal to support themselves in prison. Other conditions have also been imposed in the acts for the relief of insolvent debtors which have of late years been passed by parliament.

Days of GRACE, three days immediately following the term of payment of a bill, within which the creditor must note and protest it if payment is not obtained, in order to intitle him to recover against the drawer.

GRACE is also a title of dignity given to dukes, archbishops, and in Germany to barons and other inferior princes.

GRACES, *GRATIÆ*, *Charites*, in the heathen theology, were fabulous deities, three in number, who attended on Venus. Their names are, Aglaia, Thalia, and Euphrosyne; i. e. shining, flourishing, and gay; or, according to some authors, Pasithea, Euphrosyne, and Ægiale. They were supposed by some to be the daughters of Jupiter and Eurynome the daughter of Oceanus; and by others, to be the daughters of Bacchus and Venus.

Some will have the Graces to have been four; and make them the same with the *Horæ* "hours," or rather with the four seasons of the year. A marble in the king of Prussia's cabinet represents the three Graces in the usual manner, with a fourth seated and covered with a large veil, with the words underneath, *Ad Sorores IIII*. But this group we may understand to be the three Graces, and Venus, who was their sister, as being daughter of Jupiter and Dione.

The Graces are always supposed to have hold of each other's hands, and never parted. They were painted naked, to show that the Graces borrow nothing from art, and that they have no other beauties than what are natural. Yet in the first ages they were not represented naked, as appears from Pausanias, lib. vi. and lib. ix. who describes their temple and statues. They were of wood, all but their heads, feet, and hands, which were white marble. Their robe or gown was gilt; one of them held in her hand a rose, another a dye, and the third a sprig of myrtle.

GRACILIS, a muscle of the leg, thus called from its slender shape. See ANATOMY, *Table of the Muscles*.

GRACULA, the GRAKLE, in ornithology, a genus belonging to the order of picæ. See plate 15. Vol. iii. The bill is convex, cultrated, and bare at the point; the tongue is not cloven, but is fleshy and sharp; it has three toes before and one behind.

1. The *religiosa*, lesser grakle, or Indian stare, is about the size of a blackbird, the bill an inch and a half long, and of an orange colour. The general colour of the plumage is black, glossed with violet, purple, and green, in different reflections of light: on the quills is a bar of white; the feathers and legs are orange yellow, and the claws of a pale brown. This species, which is found in several parts of the East Indies, in the Isle of Hainan, and almost every isle beyond the Ganges, is remarkable for whistling, singing, and talking well, much better than any of the parrot genus, and in particular very distinct. Its food is of the vegetable kind. Those kept in this climate are observed to be very fond of cherries and grapes: if cherries are offered to one, and it does not immediately get them, it cries and whines like a young child, till it has obtained its desire. It is a very tame and familiar bird. 2. The *larita*, or boat-tailed grakle, is about the size of a cuckow. The bill is sharp, black, and an inch and a half in length; the general colour of the plumage is black, with a gloss of purple, especially on the upper parts; the legs and claws are black, the latter hooked. There is a singularity in the folding up of the tail-feathers, which, instead of forming a plain surface at top, sink into a hollow like a deep gutter. It always carries its tail expanded when on the ground, folding it up in the above singular manner only when perched or flying. It inhabits Jamaica: and it feeds on maize, beetles, and other insects, as well as on the fruit of the banana. It is likewise common in North America, keeping company with the flocks of the maize-thieves, and red-winged oriole. These breed in the swamps, and migrate in September, after which none are seen. 3. The *quiscula*, purple-jackdaw, or Barbadoes blackbird, is about the size of a blackbird: the whole bird is black, but most beautifully and richly glossed with purple, especially on the head and neck. The female is wholly of a brown colour, deepest on the wings and tail. This species inhabits Carolina, Mexico, and other parts of North America, also Jamaica. These birds for the most part feed on maize, whence the name of *maize-thieves* has been given them; but this is not their only food, for they are known also to feed on many other things. In spring, soon after the maize seed is put into the ground, they scratch it up again; and as soon as the leaf comes out, they take it up with their bills, root and all; but when it is ripe they do still more damage, for at that time they come in troops of thousands, and are so bold, that if disturbed in one part of a field they only go to another. In New Jersey and Pennsylvania three pence per dozen was once given for the dead birds, and by means of the premium they were nearly extirpated in 1750; when the persecution of them was abated on account of the great increase of worms which had taken place in the meadows, and which in the preceding year had left so little hay in New England as to occasion an importation from other parts. The grakles were therefore again tolerated, as it was observed that they fed on these worms till the maize was ripe. These birds build in trees. They are said to pass the winter in swamps which are quite overgrown with wood, from thence only appearing in mild weather; and after the maize is got in, are content to feed on other things, as the aquatic tare-grafs, and if pressed by hunger, buck-wheat and oats, &c.; they are said also to destroy that pernicious insect the bruchus pisi. Their note is pretty and agreeable; but their flesh is not good to eat. 4. The *crissatella*, or Chinese starling, is a little bigger than a blackbird. The bill is yellow or orange; and the general colour of the plumage blackish, with a tinge of blue: the legs are of a

dull yellow. These birds, which are said to talk and whistle very well, are common in China, where they are very much esteemed, and the figures of them are seen frequently in Chinese paintings. Their food is rice, insects, worms, and such-like. They are seldom brought to England alive, requiring the greatest care in the passage. There are eight other species of Gracula.

GRACULUS, in ornithology. See CORVUS.

GRADATION, in general, the ascending step by step, or in a regular and uniform manner. Thus it denotes in *logic* a form of reasoning, otherwise called *Sorites*; in painting, a gradual and insensible change of colour, by the diminution of the tints and shades. In rhetoric, it denotes the same with *CLIMAX*.

GRADISKA, a strong town of Slavonia, on the frontiers of Croatia, taken by the Turks in 1691. It is seated on the river Save, 20 miles S. W. of Posega. Lon. 18. 39. E. Lat. 45. 21. N.

GRADISKA, a strong town of Italy, in the county of Geritz, seated on the river Lisonzo, on the frontiers of Friuli. It belongs to the house of Austria, and is 15 miles S. E. of Udino. Lon. 13. 14. E. Lat. 46. 6. N.

GRADO, a strong town of Italy, in a small island of the same name, on the coast of Friuli, and in the territory of Venice, 50 miles E. by N. of Venice. Lon. 13. 10. E. Lat. 45. 46. N.

GRADUATE, a person who has taken a degree in the university. See DEGREE.

GRÆVIUS (John George), one of the most learned writers in the 17th century. In the 24th year of his age the elector of Brandenburg made him professor at Doissbourg. In 1658 he was invited to Deventer to succeed his former master Gronovius. In 1661 he was appointed professor of eloquence at Utrecht; and 12 years after he had the professorship of politics and history conferred on him. He fixed his thoughts here, and refused several advantageous offers. He had, however, the satisfaction to be sought after by many princes, and to see several of them come from Germany to study under him. He died in 1703, aged 71. His *Thesaurus antiquitatum et historiarum Italiae*, &c. and other works, are well known.

GRAFTING, or ENGRAFTING, in gardening, is the taking a shoot from one tree, and inserting it into another, in such a manner that both may unite closely and become one tree. By the ancient writers on husbandry and gardening, this operation is called *incision*, to distinguish it from inoculation or budding, which they call *inserere oculos*. Grafting has been practised from the most remote antiquity; but its origin and invention is differently related by naturalists. Theophrastus tells us, that a bird, having swallowed a fruit whole, cast it forth into a cleft or cavity of a rotten tree; where mixing with some of the putrefied parts of the wood, and being washed with the rains, it budded, and produced within this tree another tree of a different kind. This led the husbandman to certain reflections, from which, soon afterwards arose the art of engrafting.

Pliny sets the same thing in a different light: A countryman having a mind to make a pallisade in his grounds, that it might endure the longer, he bethought himself to fill up and strengthen the bottom of the pallisade, by running or wattling it with the trunks of ivy. The effect of this was, that the stakes of the pallisades taking root became engrafted into the trunks, and produced large trees; which suggested to the husbandman the art of engrafting.

The use of grafting is to propagate any curious sorts of fruit so as to be certain of the kinds; which cannot be done by any other method: for as all the good fruits have been accidentally obtained from seeds, so the seeds of these, when sown, will many of them degenerate, and produce such fruit as is not worth the cultivating: but when shoots are taken from such trees as pro-

duce good fruit, these will never alter from their kind, whatever be their stock or tree on which they are grafted.

The reason or philosophy of engrafting is somewhat obscure; and had not accident given the first hint, all our knowledge of nature would never have led us to it. The effect is ordinarily attributed to the diversity of the pores or ducts of the graft from those of the stock, which change the figure of the particles of the juices in passing through them to the rest of the tree.

Mr. Bradley, on occasion of some observations of Agricola, suggests something new on this head. The stock grafted on, he thinks, is only to be considered as a fund of vegetable matter, which is to be filtered through the cyon, and digested, and brought to maturity, as the time of growth in the vessels of the cyon directs. A cyon, therefore, of one kind, grafted on a tree of another, may be rather said to take root in the tree it is grafted in, than to unite itself with it: for it is visible that the cyon preserves its natural purity and intent, though it be fed and nourished with a mere crab; which is, without doubt, occasioned by the difference of the vessels in the cyon from those of the stock: so that grafting may be justly compared to planting.

In prosecution of this view of that ingenious author, we add, that the natural juices of the earth, by their secretion and comminution in passing through the roots, &c. before they arrive at the cyon, must doubtless arrive there half elaborated and concocted; and so disposed for a more easy, plentiful, and perfect assimilation and nutrition; whence the cyon must necessarily grow and thrive better and faster than if it were put immediately in the ground, there to live on coarse diet and harder of digestion: and the fruit produced by this further preparation in the cyon must be finer and further exalted than if fed immediately from the more imperfectly prepared and altered juices of the stock.

Many have talked of changing of species, or producing mixed fruits, by engrafting one tree on another of the same class; but as the graft carries the juices from the stock to the pulp of the fruit, there is little hope of succeeding in such an expectation by ever so many repeated grafts: but if, after changing the graft and stock several successive times, you set the seed of the fruit produced on the graft in a good mould, it is possible that a change may happen, and a new mixed plant may be produced. Thus the almond and peach may, by many changes in the graftings, and by interrations of the stones of the peaches, and of the shells of the almonds, and by teribrations of the stem of the root here and there, alter their nature so much, that the coat or pulp of the almond may approach to the nature of the peach, and the peach may have its kernel enlarged into a kind of almond; and on the same principle, the curious gardener may produce many such mixed kinds of things.

Mr. Du Hamel has observed, that, in grafting of trees, there is always found at the insertion of the graft, a change in the directions of fibres, and a sort of twisting or turning about of the vessels, which greatly imitates that in the formation of certain glands in animal bodies: and from thence he infers, that a new sort of viscous being formed by this means, the fruit may very naturally be so far influenced by it, as to be meliorated on the new branch; but that no such sudden and essential changes can be effected by those means, as too many of the writers on agriculture pretend. He observes, however, that this anatomical observation would not have been sufficient to convince him of the falsity of too many of these relations, had not experiment joined to confirm him in this opinion. He tried many grafts on different trees; and, for fear of error, repeated every experiment of consequence several times; but all served only to convince him of the truth of what he at first suspected. He grafted in the common way the peach upon the almond, the

plum upon the apricot, the pear upon the apple, the quince, and the white thorn; one species of plum on other very different species, and upon the peach the apricot and the almond. All these succeeded alike: the species of the fruit was never altered; and in those which would not come to fruit, the leaves, the wood, and the flowers, were all the same with those of the tree from whence the graft was taken.

Authors on agriculture have also mentioned a very different sort of grafting; namely, the setting grafts of one tree upon stocks of a different genus; such as the grafting the pear upon the oak, the elm, the maple, or the plum, &c. Mr. Du Hamel tried a great number of those experiments carefully, and found every one of them unsuccessful; and the natural conclusion from this was, that there must be some natural alliance between the stocks and their grafts, otherwise the latter will either never grow at all or very soon perish.

Notwithstanding the facility with which grafts generally take on good stocks, there are many accidents and uncertainties attending them in their different periods. Some perish immediately; some, after appearing healthy for many months; and some even for years. Of these last some die without the stock suffering any thing; others perish together with the stocks. It is very certain, that the greater part of grafted trees do not live so long as they would have done in their natural state; yet this is no unexceptionable rule: for there are some which evidently live the longer for this practice; nay, there are instances of grafts which, being placed on stocks naturally of short duration, live longer than when placed on those which are more robust and lasting. These irregularities have been but little considered hitherto, though they might be made productive of considerable advantages. One great requisite for the succeeding of any graft is, that it be in its own nature capable of so close and intimate an union with the substance of the stock, that it becomes as it were a natural branch of it. If all trees resembled one another in their structure and juices, the size and elasticity of their vessels, &c. probably the grafts of all trees would succeed upon one another; but this is by no means the case.

Trees are well known to be composed of numerous arrangements of hollow fibres, and these are different and unequal in every species of tree. In order to the succeeding of a graft, it is plain that there must be a conformity in its vessels and juices with those of the stock; and the more nearly they agree in this, probably the better they succeed; and the farther they differ, the worse. If there be, however, some difference in the solid parts of trees, there are evidently many more in the juices. The sap in some trees is white as milk, in others it is reddish, and in some as clear and limpid as water. In some, it is thin and very fluid; in others, thick and viscous. In the taste and smell of these juices there are also not less differences: some are sweet, some insipid, some bitter, some acrid, and some fetid: the quality of the sap thus makes a very great difference in the nature of trees; but its quantity, and derivation to the parts, is scarce less observable. Of this we have familiar instances in the willow and the box; one of which will produce longer shoots in one year than the other in twenty.

Another difference yet more striking, and indeed more essential in regard to the growth of grafts than all these, is the different season of the year at which trees shoot out their leaves, or ripen their flowers. The almond-tree is in flower before other trees in general have opened their earliest buds; and when other trees are in flower, this is full of leaves, and has its fruit set before the mulberry begins to push out its earliest buttons. When we consider all these differences in trees, we cannot but wonder how it is possible for a branch of one to live upon another; and it becomes a much more perplexing question how any graft can succeed, than how such numbers come to miscarry. A graft of one pear upon another shall be seen

to succeed presently as if upon its own tree; and in a fortnight will gain six inches in length, and so of some others.—This must be owing to the great similarity between the stock and the graft in all respects; and a great contrariety or difference in structure of parts will make as remarkable a difference on the other hand. An instance of this may be observed in the plum and the elm; which no art can ever make to succeed upon one another, whether the plum be grafted on the elm, or the elm upon the plum stock. These are examples of the extremes of easy growth, and of absolute decay; but there are many conjunctions of trees which seem of a middle nature between the two, and neither immediately perish nor totally succeed. Of these, such as were grafted in autumn usually remain green the whole winter without pushing; and those which are grafted in spring remain green a month or longer, but still without shooting. Some particular ones have also been known to make a few shoots the first, or even the second sap season after the operation; but all perish at the end of these times. Of this kind are the grafts of the pear-tree upon the elm, the maple, and the hornbeam, and the mulberry upon the elm and fig, with many others.

When we come to inquire into the cause of this, we find that these grafts, though unnatural, have yet had a communication with the stock by means of a few small vessels, which has been sufficient to keep them green, or even to make them shoot a little, during the great ascent of the sap: But the far greater number of the fibres have had all the while no communication, and are found putrefied, dried up, or covered with a putrid juice. This has evidently happened by means of the disproportion in size between the vessels of the stock and of the graft, and the great difference between their natural juices, which are obstacles abundantly sufficient to prevent either an union of the fibres or the introduction of new sap.

The grafts of the almond on the plum, and of the plum on the almond, always grow very vigorously for the first year, and give all the appearances imaginable of succeeding entirely; yet they always perish in the second or third year. The almond graft upon the plum stock always pushes out very vigorously at first; but the part of the stock immediately under the graft grows smaller and perishes, the graft absorbing too much of the juices, and the graft necessarily perishes with it. The decay of the whole generally happens early in the spring; and that plainly from the different season of the natural shooting of the two trees, the almond pushing very vigorously, and consequently draining the stock of its juices, at a time when, according to its nature, the juices are but in small quantity in it, and the sap does not begin to ascend. The grafts of the plum on the almond are, from the same cause, furnished with an abundance of sap which they have at that time no occasion for; and consequently they as certainly perish of repletion, as the other of inanition.

The peach grafted on the plum succeeds excellently, and lives longer than it would have done in a natural state; the reason seems to be, that the peach is a tender tree, shoots with great vivacity, and produces more branches than the root is able to maintain. Thus the peach trees are usually full of dead wood; and often their large branches perish, and sometimes their whole trunk. On this occasion the plum, being a slow shooting tree, communicates its virtue to the graft; and the peach consequently sends out shoots which are more robust and strong, and are no more in number than the root is able to supply with nourishment, and consequently the tree is the more lasting.

The grafts, or cyons, with which the grafting is effected, are young shoots of last summer's growth, for they must not be more than one year, and such as grow on the outside branches, and robust but moderate shooters: such also as are firm and well ripened should always be chosen from healthful trees: observ-

ing, that the middle part of each shoot is always the best graft, cut at the time of grafting to five or six inches in length, or so as to have four or five good eyes or buds; but should be preserved at full length till grafting time, and then prepared as hereafter directed.

They should be collected or cut from the trees in February, in mild weather, before their buds begin to swell, or advance much for shooting: in collecting them, choose such as have not made lateral or side shoots; cut them off at full length; and if they are not to be used as soon as they are collected, lay their lower ends in some dry earth in a warm border till grafting time, and, if severe weather should happen, cover them with dry litter.

The proper tools and other materials used in grafting are, 1. A strong knife for cutting off the heads of the stocks, previous to the insertion of the graft; also a small hand-saw for occasional use in cutting off the heads of large stocks. 2. A common grafting knife, or strong sharp pen-knife, for cutting and shaping the grafts ready for insertion; also to slope and form the stocks for the reception of the grafts. 3. A flat grafting-chisel and small mallet for clefting large stocks, in cleft-grafting, for the reception of the graft. 4. A quantity of new bals strings for bandages, for tying the grafted parts close, to secure the grafts, and promote their speedy union with the stock. And, 5. A quantity of grafting clay, for claying closely round the grafts after their insertion and binding, to defend the parts from being dried by the sun and winds, or too much liquefied by wet, or pinched by cold; for these parts ought to be closely surrounded with a coat of clay in such a manner as effectually to guard them from all weathers, which would prove injurious to young grafts, and destroy their cementing property, so as to prevent the junction. For this, a kind of stiff loamy mortar must be prepared of strong fat loam, or, in default thereof, any sort of tough binding clay, either of which should be laid in an heap, adding thereto about a fourth of fresh horse-dung free from litter, and a portion of cut hay, mixing the whole well together, and adding a little water: then let the whole be well beaten with a stick upon a floor, or other hard substance; and as it becomes too dry, apply more water, at every beating turning it over, always continuing to beat it well at top till it becomes flat; which must be repeated more or less according to the nature of the clay, but should be several times done the first day: next morning repeat the beating, still moistening it with water; and by thus repeating the beating six or eight times every day for two or three days, or every other day at least, for a week, it will be in proper order for use; observing, it should be prepared a week at least before it is used, but if a month the better.

The season for performing the operation of grafting is February and March: though, when the work is performed in February, it for the general part proves the most successful, more especially for cherries, plums, and pears; and March grafting is well adapted for apples.

There are different methods of grafting in practice, termed Whip-grafting—Cleft-grafting—Crown-grafting—Cheek-grafting—Side-grafting—Root-grafting—and Grafting by approach or Inarching: but Whip-grafting and Cleft-grafting, are most commonly used; and Whip-grafting most of all, as being the most expeditious and successful of any.

Whip-grafting.—This being the most successful method of grafting is the most commonly practised in all the nurseries; it is always performed upon small stocks, from about the size of a goose-quill to half an inch or a little more or less in diameter, but the nearer the stock and graft approach in size the better. It is called *whip-grafting*, because the grafts and stocks being nearly of a size are sloped on one side so as to fit each other, and tied together in the manner of whips, or joints of angling-

rods, &c. and the method is as follows. Having got the cyons or grafts, knife, bandages, and clay ready, then begin the work by cutting off the head of the stock at some clear smooth part thereof; this done, cut one side sloping upward, about an inch and a half or near two inches in length, and make a notch or small slit near the upper part of the slope downward about half an inch long, to receive the tongue of the cyon; then prepare the cyon, cutting it to five or six inches in length, forming the lower end also in a sloping manner, so as exactly to fit the sloped part of the stock, as if cut from the same place, that the rinds of both may join evenly in every part; and fashion it so as to form a sort of tongue to fit the slit made in the slope of the stock; then place the graft, inserting the tongue of it into the slit of the stock, applying the parts as evenly and close as possible; and immediately tie the parts close together with a string of bafs, bringing it in a neat manner several times round the stock and graft; then clay the whole over near an inch thick on every side, from about half an inch or more below the bottom of the graft, to an inch over the top of the stock, finishing the whole coat of clay in a kind of oval globular form, rather longwise, up and down, closing it effectually about the cyon and every part, so as no sun, wind, nor wet may penetrate, to prevent which is the whole intention of claying. You should examine it now and then, to see if it any where cracks or falls off, and if it does it must be instantly repaired with fresh clay. This sort of grafting may also be performed, if necessary, upon the young shoots of any bearing tree, if intended to alter the sorts of fruit, or have more than one sort on the same tree. By the middle or latter end of May, the grafts will be well united with the stock, as will be evident by the shooting of the graft; then the clay should be wholly taken away; but suffer the bafs bandage to remain some time longer until the united parts seem to swell and be too much confined by the ligature; then take the tying wholly off. Their farther culture is directed under the respective articles, whether designed for dwarfs or standards, &c.

Cleft-grafting.—This is so called, because the stock being too large for whip-grafting is cleft or slit down the middle for the reception of the graft: and is performed upon stocks from about one to two inches diameter. First, with a strong knife cut off the head of the stock; or if the stock is very large, it may be headed with a saw; and cut one side sloping upwards about an inch and half to the top; then proceed with a strong knife or chisel, to cleave the stock at top, cross-way the slope, fixing the knife or chisel towards the back of the slope, and with your mallet strike it, so as to cleave the stock about two inches, or long enough to admit the graft, keeping it open with the chisel; this done, prepare the cyon, cutting it to such length as to leave four or five eyes, the lower part of which being sloped on each side, wedge-fashion, an inch and half or two inches long, making one side to a thin edge, the other much thicker, leaving the rind thereon, which side must be placed outward in the stock. The cyon being thus formed, and the cleft in the stock being made and kept open with the chisel, place the graft therein at the back of the stock the thickest side outward, placing the whole cut part down into the cleft of the stock, making the rind of the stock and graft join exactly; then removing the grafting chisel, each side of the cleft will closely squeeze the graft, so as to hold it fast; it is then to be bound with a ligature of bafs, and clayed over, as observed in whip-grafting, leaving three or four eyes of the cyons uncovered. If intended to graft any pretty large stocks or branches by this method, two or more grafts may be inserted in each; in this case the head must be cut off horizontally, making no slope on the side, but smooth the top, then cleave it quite across, and place a graft on each side, as the stock may be cleft in two places, and insert two grafts in each cleft; they are thus to be

tied and clayed as in the other methods. This method of grafting may be performed upon the branches of bearing trees, when intended either to renew the wood or change the sort of fruit. Towards the latter end of May, or the beginning of June, the junction of the graft and stock in either method will be effectually formed, and the graft begin to shoot, when the clay may be taken off, and in a fortnight or three weeks after take off also the bandages.

Crown-grafting.—This kind of grafting is commonly practised upon such stocks as are too large to cleave, and is often performed upon the large branches of apple and pear trees, &c. that already bear fruit, when it is intended to change the sorts, or renew the tree with fresh-bearing wood. It is termed *crown-grafting*, because the stock or branch being headed down, several grafts are inserted at top all around betwixt the wood and bark, so as to give it a crown-like appearance: observing, that this kind of grafting should not be performed until March or early in April; for then the sap being in motion renders the bark and wood of the stock much easier to be separated for the admission of the graft.—The manner of performing this sort of grafting is as follows: First, cut off the head of the stock or branch with a saw horizontally, and pare the top smooth; then having the grafts, cut one side of each flat, and somewhat sloping, an inch and a half, forming a sort of shoulder at top of the slope to rest upon the crown of the stock; and then raising the rind of the stock with a wedge, so as to admit the cyon between that and the wood two inches down, place the grafts with the flat side next the wood, thrusting it down far enough for the shoulder to rest upon the top of the stock; and in this manner may be put three, four, five, or more grafts in one large stock or branch. When the grafts are all thus inserted, let the whole be tied tight and well clayed: observing to leave two or three eyes of each graft uncovered, but raising the clay an inch above the top of the stock, so as to throw the wet quickly off, without lodging about the grafted parts, which would ruin the whole work. Crown-grafting may also be performed, by making several clefts in the crown of the stock, and inserting the grafts round the top of the clefts. The grafts will be pretty well united with the stock, and exhibit a state of growth, by the end of May or beginning of June, and the clay may then be taken away. The trees grafted by this method will succeed extremely well; but, for the first two or three years, have this inconvenience attending them, of being liable to be blown out of the stock by violent winds; which must be remedied by tying long sticks to the body of the stock or branch, and each graft tied up to one of the sticks.

Check-grafting.—Cut the head of the stock off horizontally, and pare the top smooth; then cut one side sloping an inch and half or two inches deep, and cut the lower part of the graft sloping the same length, making a sort of shoulder at top of the sloped part: it is then to be placed upon the sloped part of the stock, resting the shoulder upon the crown of it: bind it with bafs, and finish with a covering of clay as in the other methods.

Side-grafting.—This is done by inserting grafts into the sides of the branches without heading them down; and may be practised upon trees to fill up any vacancy, or for the purpose of variety, to have several sorts of apples, pears, plums, &c. upon the same tree. It is performed thus. Fix upon such parts of the branches where wood is wanted to furnish the head or any part of the tree; there slope off the bark and a little of the wood, and cut the lower end of the grafts to fit the part as near as possible; then join them to the branch, and tie them with bafs, and clay them over.

Root-grafting.—This is done by Whip-grafting cyons upon pieces of the root of any tree of the same genus, and planting the root where it is to remain; it will take root, draw nourishment, and feed the graft.

Grafting by Approach, or Inarching.—This sort of grafting is, when the stocks designed to be grafted, and the tree from which you intend to take the graft, either grow so near, or can be placed so near together, that the branch or graft may be made to approach the stock, without separating it from the tree, till after its union or junction with the stock; so that the branch or graft being bent to the stock, they together form a sort of arch; whence it is called Grafting by Approach, or Inarching. Being a sure method, it is commonly practised upon such trees as are with difficulty made to succeed by any of the former ways of grafting. When intended to propagate any kind of tree or shrub by this method of grafting, if the tree, &c. is of the hardy kind, and growing in the full ground, a proper quantity of young plants for stocks must be set round it; and when grown of a proper height, the work of inarching must be performed; or, if the branches of the tree you design to graft from be too high for the stocks, in that case stocks must be planted in pots, and a slight stage must be erected round the tree, of due height to reach the branches, and the pots containing the stocks must be placed upon the stage. As to the method of performing the work: Observe, that in this method of grafting it is sometimes performed with the head of the stock cut off, and sometimes with the head left on till the graft is united with the stock; though, by previously heading the stock, the work is much easier performed; and having no top, its whole effort will be directed to the nourishment of the graft; having, however, the stocks properly placed, either planted in the ground, or in pots around the tree to be propagated: then make the most convenient branches approach the stock, and mark on the body of the branches the parts where they will most easily join to the stock, and in those parts of each branch pare away the bark and part of the wood two or three inches in length, and in the same manner pare the stock in the proper place for the junction of the graft; then make a cut upwards in the branch, so as to form a sort of tongue, and make a slit downwards in the stock to admit it; let the parts be then joined, slipping the tongue of the graft into the slit of the stock, making the whole join in an exact manner, and tie them closely together with bals, and afterwards cover the whole with a due quantity of clay, as before directed in the other methods. After this, let a stout stake be fixed, if possible, for the support of each graft; to which let that part of the stock and graft be fastened, which is necessary to prevent their being disjoined by the wind. The operation being performed in spring, let them remain in that position about four months, when they will be united, and the graft may then be separated from the mother-tree. In doing this, be careful to perform it with a steady hand, so as not to loosen or break out the graft, sloping it off downwards close to the stock: and if the head of the stock was not cut down at the time of grafting, it must now be done close to the graft, and all the old clay and bandage must also be cleared away, and replaced with new, to remain a few weeks longer. Observe, however, that if you shall think the grafts are not firmly united with the stock in the period of time above mentioned, let them remain another year till autumn, before you separate the grafts from the parent-tree. By this kind of grafting, you may raise almost any kind of tree or shrub, which is often done by way of curiosity, to ingraft a fruit-bearing branch of a fruit-tree upon any common stock of the same fraternity or genus, whereby a new tree bearing fruit is raised in a few months. This is sometimes practised upon orange and lemon trees, &c. by grafting bearing-branches upon stocks raised from the kernels of any of the same kind of fruit, or into branches of each other, so as to have oranges, lemons, and citrons, all on the same tree.

The foregoing we have chiefly extracted from Mr. Mawe's *Treatise on Gardening*; but an anonymous author has given us, in a treatise published at Hamburgh under the title *Amanitates*

Hortenses Novæ, a new method of grafting trees, so as to have very beautiful pyramids of fruit upon them, which will exceed in beauty, flavour, and quantity, all that can be otherwise produced. This, he says, he had long experienced, and gives the following method of doing it. The trees are to be transplanted in autumn, and all their branches cut off. Early in the following summer the young shoots are to be pulled off, and the buds are then to be ingrafted into them in an inverted direction. This, he says, adds not only to the beauty of the pyramids, but also makes the branches more fruitful. These are to be closely connected to the trunk, and to be fastened in with the common ligature: they are to be placed circularly round the tree, three buds in each circle, and these circles at six inches distance from one another. The old trees may be grafted in this manner, the success having been found very good in those of twenty years standing; but the most eligible trees are those which are young, vigorous, and full of juice, and are not above a finger or two thick. When these young trees are transplanted, they must be fenced round with pales to defend them from the violence of the wind; and there must be no dung put to them till they are thoroughly rooted, for fear of rotting them before the fibres strike. The buds ingrafted must be small, that the wounds made in the bark to receive them, not being very large, may heal the sooner; and if the buds do not succeed, which will be perceived in a fortnight, there must be others put in their place. The wound made to receive these buds must be a straight cut, parallel to the horizon; and the piece of bark taken out must be downward, that the rain may not get in at the wound. In the autumn of the same year, this will be a green and flourishing pyramid; and the next summer it will flower, and ripen its fruit in autumn.

We shall conclude this article with an extract from a paper by Mr. Knight of Elton, in Herefordshire, published in the *Phil. Trans.* for 1795. "Previous, says he, to making any experiments, I had conversed with several planters, who entertained an opinion, that it was impossible to obtain healthy trees of those varieties which flourished in the beginning and middle of the present century, and which now form the largest orchards in this country. The appearance of the young trees which I had seen justified the conclusion they had drawn; but the silence of every writer on the subject of planting, which had come in my way, convinced me that it was a vulgar error, and the following experiments were undertaken to prove it so.

"I suspected that the appearance of decay in the trees I had seen lately grafted arose from the diseased state of the grafts, and concluded that, if I took scions or buds from trees grafted in the year preceding, I should succeed in propagating any kind I chose. With this view I inserted some cuttings of the best wood I could find in the old trees, on young stocks raised from seed. I again inserted grafts and budstaken from these on other young stocks, and wishing to be rid of all connection with the old trees, I repeated this six years; each year taking the young shoots from the trees last grafted. Stocks of different kinds were tried, some were double grafted, others obtained from apple-trees which grew from cuttings, and others from the seed of each kind of fruit afterwards inserted on them; I was surprised to find that many of these stocks inherited all the diseases of the parent trees.

"The wood appearing perfect and healthy in many of my last grafted trees, I flattered myself that I had succeeded; but my old enemies, the moss and canker, in three years convinced me of my mistake. Some of them, however, trained to a south wall, escaped all their diseases, and seemed (like invalids) to enjoy the benefit of a better climate. I had before frequently observed, that all the old fruits suffered least in warm situations, where the soil was not unfavourable. I tried the effects of laying one kind, but the canker destroyed it at the ground. In-

deed I had no hopes of success from this method, as I had observed that several sorts which had always been propagated from cuttings were as much diseased as any others. The wood of all the old fruits has long appeared to me to possess less elasticity and hardness, and to feel more soft and spongy under the knife, than that of the new varieties which I have obtained from seed. This defect may, I think, be the immediate cause of the canker and moss, though it is probably itself the effect of old age, and therefore incurable.

"Being at length convinced that all efforts to make grafts from old and worn-out trees grow were ineffectual, I thought it probable that those taken from very young trees, raised from seed, could not be made to bear fruit. The event here answered my expectation. Cuttings from seedling apple-trees of two years old were inserted on stocks of twenty, and in a bearing state. These have now been grafted nine years, and though they have been frequently transplanted to check their growth, they have not yet produced a single blossom. I have since grafted some very old trees with cuttings from seedling apple-trees of five years old: their growth has been extremely rapid, and there appears no probability that their time of producing fruit will be accelerated, or that their health will be injured, by the great age of the stocks. A seedling apple-tree usually bears fruit in thirteen or fourteen years; and I therefore conclude, that I have to wait for a blossom till the trees from which the grafts were taken attain that age, though I have reason to believe, from the form of their buds, that they will be extremely prolific. Every cutting, therefore, taken from the apple (and probably from every other) tree, will be affected by the state of the parent stock. If that be too young to produce fruit, it will grow with vigour, but will not blossom; and if it be too old, it will immediately produce fruit, but will never produce a healthy tree, and consequently never answer the intention of the planter. The root, however, and the part of the stock adjoining it, are greatly more durable than the bearing branches; and I have no doubt but that scions obtained from either would grow with vigour, when those taken from the bearing branches would not. The following experiment will at least evince the probability of this in the pear-tree. I took cuttings from the extremities of the bearing branches of some old ungrafted pear-trees, and others from scions which sprang out of the trunks near the ground, and inserted some of each on the same stocks. The former grew without thorns, as in the cultivated varieties, and produced blossoms the second year; whilst the latter assumed the appearance of stocks just raised from seeds, were covered with thorns, and have not yet produced any blossoms.

"The extremities of those branches which produce seeds in every tree probably shew the first indication of decay; and we frequently see (particularly in the oak) young branches produced from the trunk, when the ends of the old ones have long been dead. The same tree when cropped will produce an almost eternal succession of branches. The durability of the apple and pear I have long suspected to be different in different varieties, but that none of either would vegetate with vigour much, if at all, beyond the life of the parent stock, provided that died from mere old age. I am confirmed in this opinion by the books you did me the honour to send me: of the apples mentioned and described by Parkinson, the names only remain, and those since applied to other kinds now also worn out; but many of Evelyn's are still well known, particularly the red-streak. This apple, he informs us, was raised from seed by lord Scudamore in the beginning of the last century. We have many trees of it, but they appear to have been in a state of decay during the last forty years. Some others mentioned by him are in a much better state of vegetation; but they have all ceased to deserve the attention of the planter. The durability of the pear is probably something more than double that of the apple.

"It has been remarked by Evelyn, and by almost every writer since on the subject of planting, that the growth of plants raised from seeds was more rapid, and that they produced better trees than those obtained from layers or cuttings. This seems to point out some kind of decay attending the latter modes of propagation, though the custom in the public nurseries of taking layers from stools (trees cropped annually close to the ground) probably retards its effects, as each plant rises immediately from the root of the parent stock.

"Were a tree capable of affording an eternal succession of healthy plants from its roots, I think our woods must have been wholly overrun with those species of trees which propagate in this manner, as those scions from the roots always grow in the first three or four years with much greater rapidity than seedling plants. An aspen is seldom seen without a thousand suckers rising from its roots; yet this tree is thinly, though universally, scattered over the woodlands of this country. I can speak from experience, that the luxuriance and excessive disposition to extend itself in another plant, which propagates itself from the root (the raspberry), decline in twenty years from the seed. The common elm being always propagated from scions or layers, and growing with luxuriance, seems to form an exception; but as some varieties grow much better than others, it appears not improbable that the most healthy are those which have last been obtained from seed. The different degrees of health in our peach and nectarine trees may, I think, arise from the same source. The oak is much more long-lived in the north of Europe than here; though its timber is less durable, from the numerous pores attending its slow growth. The climate of this country being colder than its native may in the same way add to the durability of the elm; which may possibly be further increased by its not producing seeds in this climate, as the life of many annuals may be increased to twice its natural period, if not more, by preventing their seeding.

"I have been induced to say a great deal more on this subject than, I fear, you will think it deserves, from a conviction that immense advantages would arise from the cultivation of the pear and apple in other countries, and that the ill success which has attended any efforts to propagate them has arisen from the use of worn out and diseased kinds. Their cultivation is ill understood in this country, and worse practised; yet an acre of ground, fully planted, frequently affords an average produce of more than five hundred gallons of liquor, with a tolerably good crop of grass; and I have not the least doubt but that there are large quantities of ground in almost every county in England capable of affording an equal produce."

GRAHAM (George), clock and watch maker, the most ingenious and accurate artist of his time, was born in 1675. After his apprenticeship, Mr. Tompion received him into his family, purely on account of his merit; and treated him with a kind of parental affection as long as he lived. Beside his universally acknowledged skill in his profession, he was a complete mechanic and astronomer; the great mural arch in the observatory at Greenwich was made for Dr. Halley, under his immediate inspection, and divided by his own hand: and from this incomparable original, the best foreign instruments of the kind are copies made by English artists. The sector by which Dr. Bradley first discovered two new motions in the fixed stars was of his invention and fabric: and when the French academicians were sent to the north to ascertain the figure of the earth, Mr. Graham was thought the fittest person in Europe to supply them with instruments; those who went to the south were not so well furnished. He was for many years a member of the Royal Society, to which he communicated several ingenious and important discoveries, and regarded the advancement of science more than the accumulation of wealth. He died in 1751.

GRAMAM's *Dyke*. See ANTONINUS's *Wall*.

GRAIN, corn of all sorts, as barley, oats, rye, &c. See CORN, WHEAT, &c.

GRAIN is also the name of a small weight, the twentieth part of a scruple in apothecaries weight, and the twenty-fourth of a penny-weight troy. A grain-weight of gold-bullion is worth two-pence, and that of silver but half a farthing.

GRAIN also denotes the component particles of stones and metals, the veins of wood, &c. Hence cross-grained, or against the grain, means contrary to the fibres, of wood, &c.

GRAIN (Baptist le), master of the requests in ordinary to Mary de Medicis queen of France's household, wrote *The History of Henry the Great*, and of *Louis XIII.* from the beginning of his reign to the death of the marshal d'Ancre in 1617. This history is reckoned to be written with impartiality, and the spirit of a true patriot, and contains many things not to be found any where else. He vigorously asserts the edict that had been granted to the reformed.

GRALLÆ, in ornithology, is an order of birds analogous to the *bruta* in the class of *mammalia*, in the Linnæan system. See ZOOLOGY and ORNITHOLOGY.

GRAMINA, GRASSES; one of the seven tribes or natural families, into which all vegetables are distributed by Linnæus in his *Philosophia Botanica*. They are defined to be plants which have very simple leaves, a jointed stem, a husky calyx termed *gluma*, and a single seed. This description includes the several sorts of corn as well as grasses. In Tournefort they constitute a part of the fifteenth class, termed *apetalæ*; and in Linnæus's sexual method, they are mostly contained in the second order of the third class, called *triandria digynia*. This numerous and natural family of the grasses has engaged the attention and researches of several eminent botanists. The principal of these are, Ray, Monti, Micheli, and Linnæus.

M. Monti, in his *Catalogus stirpium agri Bononiensis gramina ac bujus modi affinia complectens*, printed at Bononia in 1719, divides the grasses from the disposition of their flowers, as Theophrastus and Ray have divided them before him, into three sections or orders—These are, 1. Grasses having flowers col-

lected in a spike. 2. Grasses having their flowers collected in a panicle or loose spike. 3. Plants that in their habit and external appearance are allied to the grasses. This class would have been natural if the author had not improperly introduced sweet rush, juncus, and arrow-headed grass, into the third section. Monti enumerates about 306 species of the grasses, which he reduces under Tournefort's genera; to these he has added three new genera.

Scheuchzer, in his *Aristographia*, published likewise in 1719, divides the grasses, as Monti, from the disposition of their flowers, into the five following sections: 1. Grasses with flowers in a spike, as phalaris, anthoxanthum, and frumentum. 2. Irregular grasses, as schœnanthus and cornucopiæ. 3. Grasses with flowers growing in a simple panicle or loose spike, as reed and millet. 4. Grasses with flowers growing in a compound panicle, or diffused spike, as oats and poa. 5. Plants by their habit nearly allied to the grasses, as cypress grass, scirpus, linagrostis, rush, and sceuchzeria. Scheuchzer has enumerated about four hundred species, which he describes with amazing exactness. Micheli has divided the grasses into six sections, which contain in all 44 genera, and are arranged from the situation and number of the flowers.

GRAMINA, the name of the fourth order in Linnæus's *Fragmenta of a Natural Method*, consisting of the numerous and natural family of the grasses, *viz.* agrostis, aira, alopecurus or fox-tail grass, anthoxanthum or vernal grass, aristida, arundo or reed, avena or oats, bobartia, briza, bromus, cinna, cornucopiæ or horn of plenty grass, cynosurus, dactylis, elymus, festuca or fescue-grass, hordenum or barley, lagurus or hare's-tail grass, lolium or darnel, lygeum or hooded matweed, melica, mileum or millet, nardus, oryza or rice, panicum or panic-grass, paspalum, phalaris or canary-grass, phleum, poa, saccharum or sugar-cane, secale or rye, stipa or winged spike-grass, triticum or wheat, uiola or sea-side oats of Carolina, coix or Job's tears; olyra, pharus, triplicum, zea, Indian Turkey wheat or Indian corn, zizania, ægilops or wild fescue-grass, andropogon, apluda; cenchrus, holcus or Indian millet, ischæmum. See farther the article GRASSES.

G R A M M A R.

GRAMMAR is the art of rightly expressing our thoughts by words.

Grammar in general, or universal grammar, explains the principles which are common to all languages.

The grammar of any particular language, as the English grammar, applies those common principles to that particular language, according to the established usage and custom of it.

Grammar treats of sentences; and of the several parts, of which they are compounded.

Sentences consist of words; words, of one or more syllables; syllables, of one or more letters.

So that letters, syllables, words, and sentences, make up the whole subject of grammar.

INTRODUCTION.

A *letter* is the first principle, or least part, of a word.

An articulate sound is the sound of the human voice, formed by the organs of speech.

A *vowel* is a simple articulate sound, formed by the impulse of the voice, and by the opening only of the mouth in a particular manner.

A *consonant* cannot be perfectly sounded by itself; but joined with a vowel forms a compound articulate sound, by a particular motion or contact of the parts of the mouth.

A *diphthong*, or compound vowel, is the union of two or more vowels pronounced by a single impulse of the voice.

By means of inarticulate sounds beasts can express certain feelings, but man is distinguished from the brute creation by the power of modifying a much greater variety of sounds, and of fixing to each modification a particular meaning. The sounds thus modified are called words; and as words have no *natural* relation to the ideas and perceptions of which they are significant, the use of them must either have been the result of human sagacity, or have been suggested to the first man by the Author of nature.

Upon either supposition, the first language, compared with those which succeeded it, or even with itself as afterwards enlarged, must have been extremely rude and narrow. If it was of human contrivance, this will be readily granted; for what art was ever invented and brought to a state of perfection by illiterate savages? If it was taught by God, which is at least the more probable supposition, we cannot imagine that it would be more comprehensive than the ideas of those for whose immediate use it was intended; that the first men should have been taught

to express pains or pleasures which they never felt, or to utter sounds that should be afterwards significant of ideas, which at the time of utterance had not occurred to the mind of the speaker: man, having learned the elements of language, would be able himself to improve and enlarge it as his future occasions should require.

Since all our ideas are derived from sensation, it is probable that the first language possessed very few words of those denoting only the names of the external objects, with which the first inhabitants of the earth were chiefly conversant. By degrees a variety of actions and qualities would be noticed, and when men began to reflect, they would endeavour to express the inward thoughts of their mind by some metaphors taken from sensitive objects. After a considerable interval, the derivation of the last class of words is in many languages lost, and hence it is difficult to ascertain their precise meaning.

From the difference of organization in individuals, it is probable that no two persons derive exactly the same sensation from the impression made upon them by a variety of objects in nature, and the sounds used to express these objects will convey imperfectly their notions, and this imperfection will be increased when the sound denotes some thoughts of the mind transferred from these objects. Language, therefore, in general labours under a defect, which, in the present state of things, it is impossible to correct: artful men will naturally avail themselves of it to serve a bad purpose, and men of the best intentions must expect that their thoughts, when expressed by sounds, will be liable to misinterpretation. That language is the best which is capable of distinguishing every external object by its proper sound, and in which the thoughts of our mind may be expressed with the greatest facility and perspicuity.

Since it does not appear that any language has been formed by determinate rules, and each has been subject to different degrees of cultivation, they will all have their respective excellencies and defects. In determining these excellencies and defects, we may expect to meet with much altercation; and, according to the notions derived from the country which gave us birth, or the language which it was our chance to study, we shall form probably a standard for all countries. In Europe we are much attached to the structure of the Greek language. In the East the grammars are formed chiefly on the plan of the Arabic.

In expressing our thoughts, some object must be denoted by a sound, of which we affirm something. Thus, gold is heavy. *Gold* is the object: *is* denotes existence, and *heavy* is the mode of that existence. The thought may be dilated thus: Gold is heavier than lead. Where the thing affirmed is, that it is heavier than lead: and a new object is introduced with sounds to denote comparison; *or*, or more than. From the various modes used by different nations to express the property affirmed of any object, great disputes have arisen, not only on the different sorts of words necessary to constitute a language, but on the sorts of words actually existing in a given language. Thus, some writers affirm that language requires only two sorts of words; and others have written grammars for the use of children, which lay down ten sorts of words in the English language, each class being distinguished by some name derived from the Latin. Though it appears to us that words might be more commodiously distributed into the general divisions of name, and attribute or property, yet, as the Latin language has obtained universal authority, we shall bow to the established practice, and treat of words under the accustomed division, into *Noun, Article, Pronoun, Verb, Participle, Adverb, Preposition, Conjunction, and Interjection*.

CHAPTER I.

Of the NOUN or SUBSTANTIVE.

Nouns are all those words by which objects or sub-

stances are denominated, and which distinguish them from one another, without marking either quantity, quality, action, or relation. The substantive or noun is the name of the thing spoken of, and in Greek and Latin is called *name*; for it is *ονομα* in the one, and *nomen* in the other; and if in English we had called it the *name* rather than the *noun*, the appellation would have been more proper. That nouns or the names of things must make a part of every language, and that they must have been the words first suggested to the human mind, will not be disputed. Men could not speak of themselves or of any thing else, without having names for themselves and the various objects with which they are surrounded. Now, as all the objects which exist must be either in the same state in which they were produced by nature, or changed from their original state by art, or abstracted from substances by the powers of imagination, and conceived by the mind as having at least the capacity of being characterized by qualities; this naturally suggests a division of nouns into NATURAL, as *man, vegetable, tree, &c.* ARTIFICIAL, as *house, ship, watch, &c.* and ABSTRACT, as *whiteness, motion, temperance, &c.*

But the diversity of objects is so great, that had each individual a distinct and proper name, it would be impossible for the most tenacious memory, during the course of the longest life, to retain even the nouns of the narrowest language. It has therefore been found expedient, when a number of things resemble each other in some important particulars, to arrange them all under one species; to which is given a name that belongs equally to the whole species, and to each individual comprehended under it. Thus the word *man* denotes a species of animals, and is equally applicable to every human being: The word *horse* denotes another species of animals, and is equally applicable to every individual of that species of quadrupeds; but it cannot be applied to the species of men, or to any individual comprehended under that species. We find, however, that there are some qualities in which several species resemble each other; and therefore we refer them to a higher order called a genus, to which we give a name that is equally applicable to every species and every individual comprehended under it. Thus, *men* and *horses* and all living things on earth resemble each other in this respect, that they have life. We refer them therefore to the genus called *animal*; and this word belongs to every species of animals, and to each individual animal. The same classification is made both of artificial and abstract substances; of each of which there are genera, species, and individuals. Thus, in natural substances, *animal, vegetable, and fossile*, denote GENERA; *man, horse, tree, metal*, are SPECIES; and *Alexander, Bucephalus, oak, gold*, are INDIVIDUALS. In artificial substances, *edifice* is a GENUS; *house, church, tower*, are SPECIES; and the *Vatican, St. Paul's, and the Tower of London*, are INDIVIDUALS. In abstract substances, *motion* and *virtue* are GENERA; *flight* and *temperance* are SPECIES; the *flight of Mahomet*, and *temperance in wine*, are INDIVIDUALS. By arranging substances in this manner, and giving a name to each genus and species, the nouns necessary to any language are comparatively few, and easily acquired: and when we meet with an object unknown to us, we have only to examine it with attention; and, comparing it with other objects, to refer it to the genus or species which it most nearly resembles. By this contrivance we supply the want of a proper name for the individual; and so far as the resemblance is complete between it and the species to which it is referred, and of which we have given it the name, we may converse and reason about it without danger of error: Whereas, had each individual in nature a distinct and proper name, words would be innumerable and incomprehensible; and to employ our labours in language would be as idle as that study of numberless written symbols which distinguishes the Chinese.

Although nouns are thus adapted to express not the indi-

individuals, but the *genera* or *species* into which substances are classed; yet, in speaking of these substances, whether *natural*, *artificial*, or *abstract*, all men must have occasion to mention sometimes *one* of a kind, and sometimes *more* than one. In every language, therefore, nouns must admit of some variation in their form, to denote *unity* and *plurality*; and this variation is called *number*. Thus in the English language, when we speak of a single place of habitation, we call it a *house*; but if of more, we call them *houses*. In the first of these cases the noun is said to be in the *singular*, in the last case it is in the *plural* number. Greek nouns have also a *dual* number to express *two* individuals, as have likewise some Hebrew nouns: but this variation is evidently not essential to language; and it is perhaps doubtful whether it ought to be considered as an elegance or a deformity.

But although number be a natural accident of nouns, it can only be considered as *essential* to those which denote *genera* or *species*. Thus we may have occasion to speak of *one animal* or of *many animals*, of *one man* or of *many men*; and therefore the nouns *animal* and *man* must be capable of expressing *plurality* as well as *unity*. But this is not the case with respect to the *proper names* of *individuals*: for we can only say *Xenophon*, *Aristotle*, *Plato*, &c. in the *singular*; as, were any one of these names to assume a *plural* form, it would cease to be the *proper name* of an *individual*, and become the *common name* of a *species*. Thus, we say the *Cæsars*, the *Howards*, the *Peabodys*, the *Montagues*, &c.: but *Socrates* can never become *plural*, so long as we know of *no more than one man* of that name.

Besides *number*, another characteristic visible in substance is that of *SEX*. Every substance is either *male* or *female*; or *both male and female*; or *neither one nor the other*. With regard to this great natural characteristic, grammarians have made only a threefold distinction of nouns: those which denote *males* are said to be of the *masculine gender*; those which denote *females*, of the *feminine*: and those which denote substances, that admit not of *sex*, are said to be *neuter* or of *neither gender*. All *animals* have *sex*: and therefore the *names* of all *animals* should have *gender*. But the *sex* of all is not equally obvious, nor equally worthy of attention. In those *species* that are most common, or of which the *male* and the *female* are, by their *size*, *form*, *colour*, or other outward circumstances, *eminently distinguished*, the *male* is sometimes called by *one name*, which is *masculine*; and the *female* by a *different name*, which is *feminine*. Thus in English we say *husband*, *wife*; *king*, *queen*; *father*, *mother*; *son*, *daughter*, &c. In others of similar distinction, the name of the *male* is applied to the *female*, only by prefixing a syllable or by altering the termination; as *man*, *woman*; *lion*, *lioness*; *emperor*, *empress*, anciently *emperess*; *master*, *mistress*, anciently *mastreress*, &c. When the *sex* of any animal is not obvious, or not material to be known, the same name, in some languages, is applied without variation to *all the species*, and that name is said to be of the *common gender*. Thus in Latin *bos albus* is a white ox, and *bos alba* a white cow. Diminutive insects, though they are doubtless male and female, seem to be considered in the English language as if they were really creeping *things*. No man, speaking of a *quorm*, would say *he* creeps, but *it* creeps, upon the ground. But, although the origin of *genders* is thus clear and obvious, yet the English is the only language, with which we are acquainted, that deviates not, except in this single instance of insects, from the order of nature. Greek and Latin, and many of the modern tongues, have nouns, some masculine, some feminine, which denote substances where *sex* never had existence. Nay, some languages are so particularly defective in this respect, as to class every object, inanimate as well as animate, under either the *masculine* or the *feminine gender*, as they have no *neuter gender* for those which are of *neither sex*. This is the case with the

Hebrew, French, Italian, and Spanish. But the English, strictly following the order of nature, puts every noun which denotes a *male animal*, and no other, in the *masculine gender*; every name of a *female animal*, in the *feminine*; and every animal, whose *sex* is not *obvious* or *known*, as well as every *inanimate object* whatever, in the *neuter gender*. And this gives our language an advantage above most others in the poetical and rhetorical style: for, when nouns naturally neuter are converted into masculine and feminine, the *personification* is more distinctly and more forcibly marked.

In some languages there is a variation in the noun, called by grammarians *case*. The Latin has five cases, the Greek four, the German three, the English one, the Hebrew none. From this difference in the use of cases, it is evident that they are not to be considered as essential in language. In English the variation in the ending of the noun expresses possession: and hence it is called the *possessive case*. Thus, from *God* we have, for the possessive case, *God's*; by thus adding *s* or *is* to the name, we express a connection between him and some other object then spoken of. Thus, *God's house* implies the house belonging to *God*: and old writers frequently used the word *his*, which may have given rise to the case: thus *God his house*. In the Hebrew this connection is expressed by the mere position of the two words. For other relations of one thing to another, we use prepositions; thus, *to*, *from*, *by*, which relations in other languages are expressed by a change in the end of the noun, and this change derives its origin probably from some suffix which had the force of our preposition.

CHAPTER II.

On ARTICLES or DEFINITIVES.

MANY and severe have been the disputes among grammarians upon the use and meaning of these little words. Reasoning oftentimes from a metaphor, they persuade themselves at last that they have made some notable discovery: and because in a building there must be joints and nails, we must have in language little words or pegs to keep all things together. Thus Mr. Harris, whose knowledge was derived from the Greek language and Greek grammarians, and whose principles, as is natural from knowledge founded on so narrow a basis, are contradicted by the slightest acquaintance with the Teutonic and Arabic, leads us through many a maze; and we might have wandered till this moment, if Mr. Tooke, in his excellent work on the word *that*, enlarged in his *Upea Pterocenta*, had not pointed out to us the open and straight road of etymology, when we can travel upon it, and, when that fails us, of analogy. In the English language we call the words *a* and *the* articles: the Germans have *ein* and *der*: the French *un* and *le*: the Greeks *ο*: the Hebrews, *א*: but the unfortunate Latins are said to be without these joints and pegs in speech. But if one language is without them, they are, it is evident, not essential to language: and it will be found difficult to make such a definition as shall exclude a variety of words, such as, *hic*, *this*, *that*, &c. from making a part of this division.

In the languages above mentioned the precise meaning of the words, *the*, *der*, *le*, *ο*, and *א*, cannot at first sight be ascertained. The English word *a* points obscurely to its meaning. The German *ein* and the French *un* clear the road for investigation. They are to be found continually applied to substantives, and mean one: for it is obvious that in common conversation we must frequently find it necessary to limit the object of it to one of a species. As the object must sometimes be limited, at others this limitation may not be necessary; and it is curious to observe how different nations express the same idea. Thus if a thing is generally reported, we say in English "they say," meaning a great number say so: and so in French it is, *on dit*, or

unus dicit, "one person says," so meaning more than one person by an ellipsis very common in that language: in German it is *man sagt*, by *man* meaning man in general. We have thus found, that in two languages one of the articles is merely a word of number. Probably it may be so in English; *a* may mean *one*, or it is an abbreviation of *any*. By trying the two senses it is evident, that *any* cannot be applied in the room of *a*, but that *one* always can: and hence we might conclude that *a* and *an* are only other words for *one*, and answer to the German *ein*.

The article *the*, as it is called, may not discover itself so easily. Yet let us try the same analogy, for the etymology of it is not ascertained. *The* answers to *der* of the Germans, and *le* of the French: but what is *le*? the *ille* of the Latins, and hence we may reasonably presume that our word *the* is no more an article than *ille*, and in fact that it comes from some adjective of the same signification. Let us try by etymology. In German we have *der*, *die*, *das*: which was antiently *ther*, *thia* (*thio* *thiu*) *thiz*, and in the plural *thie* (*thier*). This looks very much like our *the*. In the Anglo-Saxon we find *sa* *seo*, *that*: in Islandic, *sa*, *su*, *that*: in Gothick *sa*, *so*, *thata*: in Hebrew *זֶה*, *זֶה*, *זֶה*: Etymologists perhaps will not be displeased at our making the words *זֶה* and *the* proceed from the same original, and we shall not be afraid of exposing ourselves to the laughter of critics, if we refer the Doric *τὸς* to the same stock. - If we are right in our conjectures, the word *the* is as much a pronoun as the *ille* of the Latins: but, if persons choose to have a distinct class of words under the name of articles, we may say, that the English has two, *a* and *the*, which "serve to define and ascertain any particular object, so as to distinguish it from the other objects of the general class to which it belongs, and of course to denote its individuality."

CHAPTER III.

ON PRONOUNS, or SUBSTANTIVES of the SECOND ORDER.

IN communicating thoughts, a person must either speak of himself, of the person to whom he is speaking, or of some other persons or things. The word referring to the speaker is called the pronoun of the first person; the word referring to the person spoken to is the pronoun of the second person; the word referring to other persons is the pronoun of the third person. The use of such words is to avoid repetition. "The man speaking says so and so" must be used continually, if the word *I* did not answer the same purpose: in the same manner *thou*, *he*, *she*, *they*, &c. answer similar purposes.

Hence we see why it is improper to say *the I* or *the thou*; for each of these pronouns has of itself the force of a noun with the definite article prefixed, and denotes a person of whom something is predicated, which distinguishes him from all other persons. *I* is the person who now speaks, *thou* is the person who is now addressed by the speaker. Hence too we see the reason why the pronoun *I* is said to be of the first, and the pronoun *thou* of the second person. These pronouns can have place only in conversation, or when a man, in the character of a public speaker, addresses himself to an audience; but it is obvious, that there must be a speaker before there can be a bearer; and therefore, that the pronouns may follow the order of nature, *I*, which denotes the person of the speaker, must take place of *thou*, which denotes the person of the bearer. Now the speaker and the bearer being the only persons engaged in conversation or declamation, *I* is with great propriety called the pronoun of the first, and *thou* the pronoun of the second person. With respect to pronouns, the third person, as it is called, is merely a negation of the other two. This is evident from the slightest attention to the import of those words which are called pronouns of the third person. *He*, *she*, or *it*, denotes

not the person either of the speaker or of the bearer; and, as we have just observed, no other person can have a share in conversation or declamation. An absent person or an absent thing may be the subject of conversation, but cannot be the speaker or the person addressed. *He*, *she*, and *it*, however, as they stand by themselves, and assume the power of nouns, are very properly denominated pronouns; but they are not personal pronouns in any other sense than as the negation of sex is the neuter gender.

We have already seen that nouns admit of number; pronouns, which are their substitutes, likewise admit of number. There may be many speakers at once of the same sentiment, as well as one, who, including himself, speaks the sentiment of many: speech may likewise be addressed to many at a time, as well as to one; and the subject of the discourse may likewise be many. The pronoun, therefore, of every one of the persons must admit of number to express this singularity or plurality. Hence the pronoun of the first person *I* has the plural *we*; that of the second person *thou* has the plural *ye* or *you*; and that of the third person *he*, *she*, or *it*, has the plural *they*, which is equally applied to all the three genders.

There is a great deal of caprice in the use of these pronouns in different nations. Thus the English in addressing a person use the second pronoun plural instead of the second singular: the Italians speak in the third person singular of the person spoken to; and the Germans, from the ridiculous notions which they entertain of birth, and the servile state into which in consequence their minds have been reduced, use the third and the second persons plural, the third and the second persons singular according to the respect which they have for the person addressed. When the second person is used, it is either to God, an object of the greatest familiarity and affection, or as a mark of the utmost contempt or superiority. The pronoun *we* is in general used by a king when speaking of himself: but as he then speaks as an officer of and in the name of the people, this may plead in favour of an abuse of speech.

In most languages the first and second persons are without gender: in Hebrew, however, the second is modified to signify the male or female. This distinction has been considered as superfluous, since the sexes of the two persons in conversation are known by their appearance. But sometimes it may be elegant. Thus if we were to say to a woman, Wouldest thou do such a thing? then a woman implying that the action was derogatory to the female character, we cannot do it by the pronoun alone. The change of *at* for *attab* may convey this reproof very pointedly in the Hebrew, *thou! at!*

The pronoun of the third person denoting neither the speaker nor the bearer, but the subject of the discourse, and being merely the substitute of a noun which may be either masculine, feminine, or neuter, must of necessity agree with the noun which it represents, and admit of a triple distinction significant of gender. In English, which allows its adjectives no genders, this pronoun is *he* in the masculine, *she* in the feminine, and *it* in the neuter; the utility of which distinction may be better found in supposing it away. Suppose, for example, that we should in history read these words: *He caused him to destroy him*—and were informed that the pronoun, which is here thrice repeated, stood each time for something different; that is to say, for a man, for a woman, and for a city, whose names were *Alexander*, *Thais*, and *Persepolis*. Taking the pronoun in this manner—divested of its gender—how would it appear which was destroyed, which the destroyer, and which the cause that moved to the destruction? But there is no ambiguity when we hear the genders distinguished: when we are told, with the proper distinctions, that *she caused him to destroy it*, we know with certainty that the promoter was the woman; that her instrument was the hero; and that the subject of their cruelty was the unfortunate city. From this example we should be surprised how the Italians,

French, and *Spaniards*, could express themselves with precision or elegance with no more than two variations of this pronoun.

Although, in every language with which we are now acquainted, there is but one pronoun for each of the first and second persons; and although it is obvious from the nature and import of those words, that no more can be necessary; yet the mere *English* reader may perhaps be puzzled with finding three distinct words applied to each; I, MINE, and ME, for the first person, THOU, THINE, and THEE, for the second. The learned reader will see at once that the words MINE and ME, THINE and THEE, are equivalent to the *genitive* and *accusative* cases of the Latin pronouns of the first and second persons. That MINE is a pronoun in the possessive case is obvious; for if I were asked "whole book is that before me?" I should reply—"It is MINE;" meaning that it belongs to me. That the word ME is the same pronoun in the case which the Latin grammarians call the *accusative*, is evident from the import of that word in the sentence HE ADMIRES ME, where the admiration is supposed to proceed from the person spoken of to the person *quo* speaks. It appears therefore, that though *English* nouns have only two cases, the *nominative* and *possessive*, the pronouns of that language have three, as I, MINE, ME; THOU, THINE, THEE; HE, HIS, HIM, &c. Both pronouns, the *Latin* and the *English*, are irregularly inflected: and those words which are called the oblique cases of each were originally derived from nominatives different from EGO and I; but these nominatives are now lost, and *mei* and *mine* have, beyond all dispute, the effect of the genitives of the *Latin* and *English* pronouns of the first person.

From the account here given of the personal pronouns, it appears that the first or second will, either of them, coalesce with the third, but not with each other. For example, it is good sense, as well as good grammar, to say in any language, I AM HE—THOU ART HE—WE WERE THEY—YOU WERE THEY; but we cannot say—I AM THOU—nor THOU ART I—nor WE ARE YOU, &c. The reason is, there is no absurdity for the speaker to be the subject also of the discourse, as when it is said—I am he; or for the person addressed, as when we say, thou art he. But for the same person, in the same circumstances, to be at once the speaker and the party addressed, is impossible; for which reason the coalescence of the pronouns of the first and second persons is likewise impossible.

I, THOU, HE, SHE, and IT, are all that are usually called personal pronouns. There is another class of words, which are called sometimes *pronominal adjectives*, sometimes *adjective pronouns*, sometimes *possessive pronouns*; and by one writer of grammar they have been most absurdly termed *pronominal articles*. It is not worth while to dispute about a name; but the words in question are MY, THY, HER, OUR, YOUR, THEIR. These words are evidently in the form of *adjectives*: for, like other *English* adjectives, they have no variation to indicate either gender, number, or case; and yet they are put in concord with nouns of every gender and both numbers, as MY WIFE, MY SON, MY BOOK—HER HUSBAND, HER SONS, HER DAUGHTERS, &c. But, though in the form of *adjectives*, they have the power of the personal pronouns in the *possessive* case: MY BOOK is the book of ME, or the book of HIM WHO NOW SPEAKS; OUR HOUSE is the house of US, or the house occupied by the PERSONS WHO NOW SPEAK; HER HUSBAND is the husband of a woman who can be known only from something preceding in the discourse; and THEIR PROPERTY is the property of them—of any persons, whether men or women, or both, who have been previously mentioned. Words which have the form of *adjectives*, with the power of pronouns, may, without impropriety, be called *pronominal adjectives*; and such is the name by which we shall henceforth distinguish them. To these *pronominal adjectives*, as well as to the personal pronouns, are subjoined the words *own* and *self*—in the plural *selves*; in which case they are emphatical, and imply a

silent contrariety or opposition. Thus, I live in my own house; that is, not in a hired house. This I did with my own hand; that is, not by proxy. This was done by myself; that is, not by another. The word *self* subjoined to a personal pronoun forms also the reciprocal pronoun; as, We hurt ourselves by vain rage; he blamed himself for his misfortune. Himself, itself, themselves, are supposed by Wallis to be put, by corruption, for his self, its self, their selves; so that *self* is always a substantive or noun, and not a pronoun. This seems to be a just observation: for we say, the man came himself; they went themselves; where the words *himself* and *themselves* cannot be accusatives but nominatives, and were anciently written *his self*, *their selves*.

There are other words which are usually ranked under the class of pronouns; as *who*, *which*, *what*. These, when employed in asking questions, are called *interrogative pronouns*; though a name more characteristic might surely be found for them. Their import, however, will be more easily ascertained after we have considered another species of pronouns, which have been denominated *relatives*, and with which they are intimately connected.

The pronouns already mentioned may be called *prepositive*, as may indeed all substantives, because they are capable of introducing or leading a sentence: but there is another pronoun which has a character peculiar to itself; and which, as it is never employed but to connect sentences, and must therefore have always a reference to something preceding, is called the *subjunctive* or *relative* pronoun. This pronoun is in Greek, *ὃς, ἡ, ἓ*; in *Latin*, QUI, QUE, QUOD; and in *English*, WHO, WHICH, THAT.

In order to determine with precision the nature and import of the *relative* pronoun, it will be necessary to ascertain the powers which it contains, or the parts of speech into which it is capable of being resolved. Now it is obvious, that there is not a single noun, or *prepositive* pronoun, which the *relative* is not capable of representing: for we say, I, who saw him yesterday, cannot be mistaken; YOU, who did not see him, may have been misinformed; THEY, who neither saw nor heard, can know nothing of the matter; THE THINGS, which he exhibited, were wonderful. From these examples it is apparent, in the first place, that the *relative* contains in itself the force of any other pronoun: but it contains something more.

If from any sentence in which there is a *relative*, that relative be taken away, and the *prepositive* pronoun, which it represents, be substituted in its stead, the sentence will lose its bond of union, and stand quite loose and unconnected. Thus, if instead of saying the man is wise who speaks little, we should say the man is wise, he speaks little, the sentence would be resolved into two; and what is affirmed of the man's wisdom would have no connection with the circumstance of his speaking little. Hence it is evident, in the second place, that the *relative* contains the force of a *connective* as well as of the *prepositive* pronoun. What kind of connection it denotes, is next to be ascertained.

It may be laid down as a general principle, "that, by means of the *relative* pronoun, a clause of a sentence, in which there is a verb, is converted into the nature of an adjective, and made to denote some attribute of a substance, or some property or circumstance belonging to the antecedent noun." Thus, when it is said, homo qui prudentia præditus est, the relative clause—qui prudentia præditus est, expresses nothing more than the quality of prudence in concrete with the subject homo, which might have been equally well expressed by the adjective prudens.

Now if a relative clause expresses that which might be expressed by an adjective, the presumption is, that it may be resolved into the same constituent parts. But every adjective contains the powers of an abstract substantive, together with an expression of connection; and may be resolved into the *genitive*

case of that substantive, or into the *nominative* with the particle *of* prefixed, which in English corresponds to the termination of the genitive in the ancient languages. That the member of a sentence, in which there is a relative, may, in every instance, be analysed in the same manner, will be apparent from the following examples. *Vir qui sapit, vir sapiens, and vir sapientia*; "a man who is wise, a wise man, and a man of wisdom;" are certainly phrases of the same import. Again, *homo, cui ingratus est animus, malus fit amicus*, may be translated into Greek, ἀνθρώπος ἀχαρίστιας κακὸς γίνεται φίλος; and into English, "the man of ingratitude is a bad friend."

Thus then it appears, that the *relative pronoun* contains in itself the force of the *prepositive pronoun*, together with that connection implied in English by the preposition *of*, and in the ancient languages by the *genitive case*. When one says, *vir sapit qui pauca loquitur*, the relative clause *qui pauca loquitur* expresses that attribute of the man from which his wisdom is inferred: it is conceived by the mind as stripped of its propositional form, and standing in the place of a substantive noun governed in the genitive case by *vir*. The whole sentence might be thus translated, "the man of little speaking is wise;" or, did the use of the English language admit of it, "the man of he speaks little is wise."

We are sensible, that these expressions will appear extremely uncouth and offensive; but we mean not to recommend them as common modes of phraseology. Against their being employed as such, present use loudly remonstrates. They are introduced only with a view to show the true import of the *relative pronoun*; and for that purpose they are well adapted. That pronoun seems to be of use only when there is a deficiency of *adjectives* or *substantives* to denote some *complex attribute* by which we want to limit a general term or expression. Where such adjectives or substantives exist in language, we may indeed use the *relative* or not at pleasure. Thus we say, *homo qui grandia loquitur, or homo grandiloquus*; because the *adjective* and the *relative clause* are perfectly of the same meaning. But if the Latins were called upon to translate ἄνθρωπος αἰδοδιχαλός, we believe they must have made use of the *relative pronoun*, as we know not any correspondent adjective in their language.

Some persons have supposed that the *relative* is equivalent to another pronoun, together with an expression of connection of that kind which is denoted by the particle *and*.

But the absurdity of this opinion will appear from the following sentence: "Charles XII. was the only monarch who conquered kingdoms to bestow them on his friends." Here it is evident there is but one proposition, of which the predicate is expressed by the words—"only monarch who conquered kingdoms to bestow them on his friends;" so that the *relative clause* is a necessary part of the predicate, and has, like an *abstract noun* in the genitive case, the effect of modifying the general term *monarch*. Resolve this sentence, and you have two propositions, of which the first is a notorious falsehood:—"Charles XII. was the only monarch; and he conquered kingdoms to bestow them on his friends." But instead of *and* substitute of—saying, "Charles XII. was the only monarch of he conquered kingdoms to bestow them on his friends," and you preserve the true import of the expression.

Are there no cases, then, in which the *relative* may be resolved into the connective *and* with a prepositive pronoun? Undoubtedly there are, and we shall now endeavour to ascertain them.

Adjectives in language have two different effects upon the substantives to which they belong, according to the nature of the attribute which they express. If the attribute expressed by the adjective be competent to all the species of which the substantive is the specific name, it is plain that the adjective does not modify or limit the substantive, for this obvious reason, that no-

thing can modify which is not discriminative. Thus, when Horace says, "Prata canis albicant pruinis," the adjective *canis* denotes a quality common to all *boar-frost*; and therefore cannot modify the *substantive*, because it adds nothing to the conception of which that substantive is the name. But when the attribute expressed by the adjective is competent to some *individuals* only of the species of which the substantive is the name, the adjective has then the effect of *modifying* or *limiting* the substantive. Thus, when one says *vir bonus*, he makes use of an adjective which modifies the substantive *vir*, because it expresses a quality or attribute which does not belong to all men.

The clause of a sentence in which there is a *relative*, as it is in every other respect, so is it in this, equivalent to an *adjective*; it either *modifies*, or does not *modify*, the *antecedent*, according as the *attribute* which it expresses is or is not characteristic of the *species* to which the antecedent belongs. Thus, when it is said, "Man, who is born of a woman, is of few days and full of trouble," the relative clause—*who is born of a woman*, expresses an attribute common to all men, and therefore cannot modify. In like manner, when we say—"SOCRATES, who taught moral philosophy, was virtuous,"—the clause, *who taught moral philosophy*, does not modify. In both these instances the relative clause might be omitted; and it might be said with equal truth, "Man is of few days and full of trouble,"—and "SOCRATES was virtuous."

But if it be said, *vir sapit qui pauca loquitur*, the relative clause—*qui pauca loquitur*, modifies the antecedent *vir*; for it is not affirmed of every man, that he is wise, but only of such men as speak little. So—"Charles XII. was the only monarch who conquered kingdoms to bestow them on his friends;" and, "the man that endureth to the end shall be saved;" with many more examples that will occur to every reader.

Now it will be found, that it is only when the relative clause expresses such a property or circumstance of the antecedent as does not limit its signification, that the *relative pronoun* can be resolved into a *prepositive pronoun* with the conjunction *and*, and that in these cases the relative clause itself is of very little importance. Thus in the assertion—"Charles XII. was the only monarch who conquered kingdoms to bestow them on his friends,"—where the relative clause is *restrictive*, the *who* cannot be resolved into *and he* consistently with truth or common sense. But in the expression, "Man, who is born of a woman, is of few days and full of trouble," the relative *who* may be so resolved, at least without violating truth;—"Man is of few days and full of trouble, and he is born of a woman." The only difference between the sentence with the relative *who*, and the same sentence thus resolved,—is—that, in the former case, it contains but *one predication*; in the latter two, and these but loosely connected.

Thus then it appears that the general analysis of the *relative pronoun* is into the particle *of*, and a prepositive pronoun; but that there are also occasions on which it may be resolved into a prepositive pronoun and the particle *and*, without materially altering the sense. Now what is the reason of this distinction?

If the relative clause be equivalent to an *adjective* or to an *abstract substantive* in the genitive case, it is easy to see that the relative itself may, in every instance, be resolved into another pronoun and the particle *of*; but it will not perhaps be quite so evident how it should in any instance be resolved by *and*. This last analysis has its foundation in the nature of the particles *of* and *and*; or, to speak more properly, in the nature of the attribute which the relative clause expresses. Both the particles *of* and *and* are used to link or join conceptions together; but with this difference, that *of* has the effect of making the conceptions it connects figure in the mind as *one object*; whereas the conceptions connected by *and* are still conceived separately

as before. To explain ourselves by an example: Suppose we take two words, *man* and *virtue*, which denote two distinct ideas or conceptions, and join them together by the particle *of*, saying *man of virtue*; the mind no longer views them separately as significant of *two* conceptions, but of *one*. Take the same words, and join them together by the particle *and*, saying *man and virtue*: the conceptions denoted by *man* and *virtue* are still viewed separately as *two*; notice is only given that they are *collaterally connected*.

This being the case, it follows, that when the relative modifies the antecedent, or, in other words, when the *relative clause* and the *antecedent* denote but *one conception*, the relative must then be resolved by *of*, in order to preserve this *unity of conception*. But when the relative does *not* modify the antecedent; that is, when its clause does not express any *necessary* part of a complex conception; then the conceptions or ideas denoted by the *relative clause* and the *antecedent* may be viewed separately as *two*; and therefore the relative *may* be resolved into the corresponding prepositive pronoun and the particle *and*.

If the clause of the relative be equivalent to an adjective, as in every instance it seems to be, it will naturally occur, that in the ancient languages, the relative should agree with its antecedent, in *gender*, *number*, and *case*. They do agree for the most part in *gender* and *number*; in *case* they cannot often, because the very intention of introducing a *relative* into language is to represent the antecedent in a *different case*. Whenever we have occasion to use a *substantive* or *noun* in a clause of a sentence, and afterwards to express by *another clause*, in which there is a verb, an *attribute* of the *object* denoted by that *substantive*, we then employ the *relative pronoun*. Now it seldom happens that the two clauses *admit* of the same *regimen*; and hence the *case* of the *relative* is often *necessarily different* from that of the antecedent, as the case of each must be accommodated to the clause in which it is found. Thus we cannot say, "Deus qui colimus bonus est;" but "Deus quem colimus bonus est;" because the *regimen* of the verb *colo* is always the *accusative*.

This shows the necessity of introducing a relative into those languages which give inflexions to their nouns. Were all the nouns of a language indeclinable, there would be little occasion for a relative; and accordingly in English it is often omitted. Examples are frequent in our best authors. Suffice it to quote the following:

"For I have *business* would employ an age."

Jane Shore.

"I had several *men* died in my ship of calentures."

Swift.

"They who affect to guess at the *object* they cannot see."

Bolingbroke.

We are not ignorant that our most eminent grammarians consider such expressions as chargeable with impropriety; and we are far from recommending them in any dignified or solemn composition. But in the instances adduced there is not the smallest degree of *obscurity*; at least there is none occasioned by the *omission of the relative*. The reason seems to be, that the mind can easily, by an effort of its own, make the *antecedent* unite, first with the one clause, and then with the other. Thus when it is said—"I have *business* would employ an age;" the mind can, without any difficulty, as the word *business* has no inflexions, consider it first as the *objective case* after *have*, and then as the *nominative* to *would employ*: but this cannot be so easily done in the ancient languages, where the termination of the noun is changed by the variation of its cases.

Both in the learned and in the living languages the relative has different *forms*, corresponding to the different *genders of nouns*; and by these it gives notice whether it is applied to *persons*, or to *things without life*. Thus in the English language we say, *The man or the woman who went to Rome*; *The tree which stands on yonder plain*. It admits likewise, when applied to males or females, a variation of cases similar to that of the *personal pronouns*. Thus we say, *The man whose book is now before me*; *The man or woman whom I saw yesterday*: but the neuter admits of no such distinction*; as we say *the tree which I saw*, as well as *the tree which stands on yonder plain*. In modern languages the relative admits not of any distinction to denote *number*: for we say, *The man or the men who came yesterday*; *The man or the men of whom I speak*.

In English, the word *that* is often used instead of the *relative*, as in the following examples: "He is the same man *that* I saw yesterday:—He was the ablest prince *that* ever filled a throne." With regard to the principle upon which this acceptance of the word *that* depends, we offer the following conjecture:

In English, from the cool and phlegmatic arrangement of the language, occasioned by the want of inflexions and conjugations, the place of every part of a sentence is almost uniformly determined, and very little variety is allowed in the collocation of the words. The *adjective* is almost always placed in apposition with its *substantive*, and the *nominative* with its *verb*. In consequence of this uniformity in the collocation of the words, the mind acquires a habit of connecting in idea any kind of word with the place in which it is used to stand; and is naturally led to consider every word that stands in such a place as belonging to such a class. Hence it is, we imagine, that the definitive *that* passes into the nature of the *relative pronoun*; as in those instances in which it occupies the place of the relative, it was natural to consider it as having the same import. Yet the word *that* has undoubtedly in itself no more the force of the relative pronoun than *the* or *this*, or any other definitive whatever. In such expressions as the foregoing, it is not improbable that originally the clause of the definitive *that*, which we now call the *relative clause*, was thrown in as a kind of modifying circumstance in the following manner: "The book (I read that) is elegant;" where the speaker, finding the word *book* too general for his purpose, throws in a clause to qualify and restrict it, or to confine his affirmation to that particular book which he is then reading. We can easily suppose, that through time the definitive *that* in such an expression might be transposed or removed from its own place to that of the *relative*: so that the expression would run thus, "The book *that* I read is elegant;" which would be considered as precisely equivalent to "The book *which* I read is elegant." This opinion is not a little confirmed by a similar use of the article in Greek, which, though undoubtedly a definitive like the English *the*, is often used instead of the relative pronoun. Numberless examples may be found in *Homer* and *Herodotus*, especially in the latter, who seldom uses what is properly called the relative. We shall produce one instance from each:

Εἶπεν Ἀτρεΐδην Ἀγαμέμνονα, ΤΟΝ περὶ πρῶτον

Ζεὺς ἐνεγκέ πρῶτοις διαμπερὶς.

Iliad x. 88.

Ὅρισται γὰρ μεγάλῃ καὶ μικρῇ (Ἀθηναῖοι scil.) δεῖξαι
εἴτε κρησεσθαι νομοῖσι Τῶν ἀνδρῶν Σόλων βλήται.

Herod. Clie.

We have said that the *interrogative* pronouns, as they are called, *who*, *which*, *what*, are intimately connected with re-

* "*Whose* is by some authors made the possessive case of *which*, and applied to things as well as persons; I think improperly." Lowth.

Let us; we now affirm, that the *two first* of these words are *nothing* but relatives, and that the *last* contains in itself the united powers of a *relative* and *definitive*. With respect to *cases*, *number*, and *gender*, the words *who* and *which*, when employed as *interrogatives*, differ not from the same words when employed as *relatives*; and we hold it as a maxim, without which science could not be applied to the subject of language, that the *same word* has always the *same radical import* in whatever different situations it may be placed. To understand this, it is necessary to observe, that all men have a natural propensity to communicate their thoughts in the fewest words possible: hence it follows, that words are often omitted which are necessary to complete the construction of the sentence; and this no where happens more frequently than in the use of *who* and *which*. In sentences where these words are confessedly *relatives*, we often find them without an antecedent; as,

"Who steals my purse, steals trash." *Shakespeare.*

"Which *who* would learn, as soon may tell the sands." *Dryden.*

"Qui *Bavium* non odit, amet tua carmina, *Mævi*. Virg.

That is, "He who steals my purse, &c.;" "Which *he* would learn as soon, &c.;" and "Ille qui *Bavium* non odit," &c. Such abbreviations occasion no obscurity, because from previous circumstances the hearer knows the mind of the speaker and the persons to whom he refers. But it is not with respect to the *relative* and *antecedent* only that such abbreviations have place: in sentences of a different form, whole clauses are sometimes omitted, while the meaning of the speaker is made sufficiently plain. Thus when king Richard III. having lost his horse in battle, exclaims—"A horse! a horse! my kingdom for a horse!" there is no complete thought *expressed*; but the circumstances in which the king then was, enabled those about him to understand that he *wanted a horse*. Accordingly Catesby answers him—"Withdraw, my lord, I'll help you to a horse."

In like manner when a person asks a question, his expression is frequently incomplete; but the tone of his voice, or some other circumstance, enables us to ascertain his meaning, and to supply, if we please, the words that are omitted. Thus when it is said, *An fecisti?* nothing more is *expressed* than, *If you did it* (the Latin *an* being nothing else but the Greek *an* *si*); but some circumstance enables the person who hears it to know that the meaning is, "Say if you did it." Let us apply these observations to the words *who* and *which*. If these words be *relatives*, and if our analysis of the relative be just, it is obvious, that no *complete* meaning can be contained in the clause, "Who is your principal friend?" for that clause contains nothing more than the circumstance of *being your principal friend* predicated of some *unknown* person; "of he is your principal friend." That this is indeed the case, every man may be convinced, by asking himself what he means by the interrogative *who* in such a sentence; for he will find it impossible to affix to it *any* meaning without supplying an *antecedent clause*, by which that which is *called* an *interrogative* will be immediately converted into the *relative pronoun*. The custom, however, of language, and the tone of voice with which the *relative clause* is uttered, intimates, without the help of the *antecedent*, the wish of the speaker to be informed by the person addressed of the name and designation of his principal friend; and we know that the sentence when completed is, "Tell me the name and designation of the person who is your principal friend." Again, when the prophet says, "Who is this that cometh from Edom, with dyed garments from Bozrah?" he utters but *part* of a sentence, which when completed will run thus: "Describe the person who cometh from Edom (this is that *person*), with dyed garments from Bozrah."

He *sees* a person coming from Edom, of whose name and designation he is ignorant; he calls upon some one for information concerning these particulars; and that there may be no mistake, he describes the unknown person as having *dyed garments from Bozrah*; but lest even that description should not be sufficiently accurate, he throws in the definitive clause, *this is that person*, pointing at him, we may suppose, with his finger.—*Which*, used as an interrogative, indicates a wish of knowing a particular person or thing out of more than one mentioned; as, "Which of the two did it?" that is, "Tell me the one of the two which did it?" for in old English *which* as a *relative* is often used, where in modern English we should say *who*; and that mode of speech is still retained when the antecedent is omitted, and the relative clause employed to indicate such a wish as that before us. *What* includes in itself the signification of a *definitive* and a *relative pronoun*; as, "from *what* has gone before, *what* follows may easily be guessed;" where the word *what* is equivalent to *that which*. When therefore we say, "What rude fellow is that?" our meaning is, "Describe that person who is that rude fellow." Upon the whole, then, it is evident, that the words called *interrogatives* are merely *relative pronouns*; and that interrogative sentences are *relative clauses* uttered in such circumstances as to enable the hearer to supply the antecedents necessary to complete the meaning.

To conclude: We have seen that SUBSTANTIVES are either *primary* or *secondary*; or, in other words, NOUNS or PRONOUNS. NOUNS denote *substances*, and those either *natural*, *artificial*, or *abstract*. They moreover denote things either *general*, or *special*, or *particular*; and a *general* or *specific* name is made to denote an *individual* by means of words called *articles* or *definitives*. PRONOUNS are the substitutes of NOUNS, and are either *prepositive* or *subjunctive*. The PREPOSITIVE is distinguished into *three* orders, called the *first*, the *second*, and the *third* person. The SUBJUNCTIVE, otherwise called the RELATIVE, includes the powers of all those three, having *superadded* as of its own the peculiar force of a *connective*.

CHAPTER IV.

ON VERBS.

OF all the constituent parts of speech none has given the grammarians greater trouble than the VERB. Every schoolboy is told that the words, IS, LOVETH, WALKETH, STANDETH, in *English*; and EST, AMAT, AMATUR, AMBULAT, STAT, in *Latin*, are VERBS: he knows likewise that they are of different *kinds*; that some of them are said to be *active*, some *passive*, and some *neuter*. But it should seem, that the first object of our investigation ought to be the *characteristic* of the verb, or that which all these words have in *common*, and which constitutes them VERBS, distinguishing them from *every other species* of words. Now what does distinguish these verbs from nouns? It is affirmation or assertion, according to a generally received notion: then as all languages have verbs, we are to expect that this property of affirming, the essential of the verb, will not universally exist without the verb. But our first enquiry after verbs strikes us in an extraordinary manner. The Hebrew language wants that essential *is* or affirmative quality, when it joins the predicate to the subject with affirmation. Thus in English we say, "Happy *is* the man; the fear of God *is* the beginning of wisdom;" but this supposed essential verb is not to be found in Hebrew. *Happy the man. The fear of the Lord the beginning of wisdom.* To prove the position that affirmation is the essential attribute of the verb, the following reasoning has been used:

Should we be required to exemplify our theory by language, and to produce instances of this simplified verb in practice, we might answer, that the not being able to produce such instances would be no good argument against the truth of our principles.

It is the nature of language to express many circumstances by the same word, all of which however are not *essential* to distinguish the *species* to which that word belongs from the *other species* of words; and it is the nature of man to *infer* from discourse many things which are not *actually expressed*. Perhaps, however, something nearly approaching to an exemplification of our idea of a *simple verb* will be found in the following proposition: "The three angles of every plane triangle *are* equal to two right angles." What other office the verb *are* here performs than simply to join the *subject* and *predicate*, it is difficult to perceive. It does not give notice of *time*; or such notice, if given, is an imperfection; for the truth of the proposition is independent on time. Neither ought it to imply *existence*; for the proposition would be true, were there neither a triangle nor a right angle in nature.

Now the fact is, that the word *are* does mean existence, and existence only; and it is the word *equal*, which modifies the peculiar mode of the existence of the three angles.

Again in the English and the Hebrew languages, many words are at the same time acknowledged to be both nouns and verbs. The word *love* is a noun and a verb: but how by placing the pronoun *I* before *love*, does the latter acquire this affirmative quality? *Love is sweet: sweetness* is evidently affirmed of *love*: but when we say, "We love," how do we alter the nature of the noun but by joining the quality to ourselves? The word *love* is evidently the same in both cases, and the affirmation is not in the word itself, but understood. For this is equally good sense, "We affirm we love," which would make sad tautology if affirmation was also in love.

It has been said, and the assertion may very easily be maintained, that in all languages the radix of the verb is always a noun. It is so frequently apparent in English, that there is sufficient ground for enquiry. In Hebrew also the same analogy holds us out. In English the pronoun is separated from the verb. In Hebrew we see clearly that it is joined to it in general by abbreviation, either before or behind the verb. Hence the *o* and the *s* terminating *amo amas*, are probably the abbreviations of *ego* and *su*; and though we cannot ascertain precisely the meaning of every termination in the verbs of various languages, with increased knowledge it may perhaps be acquired.

Supposing then that the noun and the verb are in the radix exactly the same, let us examine the changes to which they are subject in consequence of their different appellation. The noun has cases, the verb has tenses. These tenses denote the different times in which a person or thing may be said to exist; also to every verb it is found that the pronoun is or may be applied; and hence perhaps we may be led to conclude, that the verb is a noun only which is capable of personal application at different times. *Desire* may be made a verb, because it can be applied to ourselves at this moment, or at a time past—*we desired*. *Globe* cannot become a verb, because though we may make a globe, be in a globe, &c. as yet it does not express a quality which can belong to persons, and it retains unchangeably its own qualities. Hence we shall not be at a loss to determine in our own language what are verbs and what are not: and the same may be applied to the infinitives of other languages, on which the learned have not determined, whether they are characteristics of the verbs, or no verbs at all.

The verb then requires *time* and *person*, the substantive does not. If the whole human race had never existed, and consequently *time* had not been the substantive, *earth* as well as the substance itself might have been the object of contemplation. Now *time*, if we speak of any event, is either *past* or *future*: and to express these tenses something must be done in the connection of the pronoun and the noun. To express *past time*, the Hebrew language places the pronoun after the noun: to express the *future*, it places the pronoun before the noun. The

English language expresses but imperfectly the *times*, and is consequently obliged to call in auxiliary verbs; it adds a syllable to the noun to express the *past time*. The Latin and Greek languages go beyond the necessity of the case, and modify the periods of *past* and *future time*.

From not attending to the nature of time in itself, philosophical grammarians, as they are called, have endeavoured to ascertain the number of *times* or *tenses*, which must be expressed by some means or other in every language. As a matter of speculation it may amuse them: they find no language agreeing with their theory, nor upon their principles can any number of tenses beyond the *past* and the *future* be allowed, which may not be doubled or trebled at pleasure. The modifications of the *past* and *future* are infinite; and different methods are used in different languages to express some of these modifications. In these modifications consists much of what is called the idiom of the language; and which, in learning a language, ought particularly to be attended to. From want of this attention, an Englishman makes continual mistakes between the *etois* and the *fus* of the French: and the translators of the Bible, from a similar want of care, or ignorance of the structure of the English and Hebrew verbs, show in a thousand instances, that they were manifestly incompetent, in this respect, for the task which they had undertaken.

Our grammars having been constructed on those of the Greek and Latin languages, a certain variation in verbs is said to take place in our language, called *moods*; but though from *amo* we have *ama, amem, amarem*, &c. yet no such change is to be found in the corresponding verb *love*. We can express the same ideas in English as in Latin: but we do not do it by *moods*, nor is a number of moods essential to any language. In English and Hebrew we see nothing like the variety of the Greek and Latin. One *mood*, if it may be so called, is necessary: the *indicative mood*; if we allow more, we can see no reason for stopping. The Latins may express by *amem*, what the English express by *I may or can love*; and consequently the English has the advantage in precision: but *I may love or can love* is indicative of possibility applied to the quality in the person, and the *I may or I can* is to be found in the *em* of the Latins. *Mood* of verb has been defined to be a concise mode of expressing some of those combinations of thoughts "which occur most frequently and are most important and striking." The definition will certainly apply to the languages which have *moods*; but of them it may perhaps be justly said, that by an addition to the radix of the verb, which is an abbreviation of some definite verbs formerly in use, several languages express certain combinations of ideas, which in other languages, from this abbreviation not having taken place, are expressed by the use of other verbs applied to the principal verb.

The Greek and Latin languages have a certain variation in their verb, which goes by the name of *voices*; and hence it has been inferred that these *voices* are essential to language: but when we come to the true philosophy of language, that is, the comparison of various languages now in or which formerly had been in existence, we shall scarcely find that any two languages agree together in the number of voices. Thus the Hebrew, in the opinion of some, has three; of others, has five voices: the Greek has three, the Latin two, the English certainly only one. These *voices* are in general distinguished from the nature, as it is called, of action or suffering; and all verbs are to be reduced to one of three classes—*acting, suffering*, or neither the one nor the other. Such a division may very well suit this or any other subject: the verb must be or not be any given thing, that may be proposed. There cannot be a doubt, that many verbs imply action, and the *agent* may become the *patient*, and he may suffer either from himself or another. Thus for the verb *beat*: *A beats B*; *A is beaten by B*; or *A beats himself*;

instead of using the verb *is*, and the noun *himself*, these parts may be comprehended in the inflection of the verb, but this modification of the verb can apply only to a small class of words relating to actions. What are we to do with such verbs as *sleep* and similar ones? They must be called *neuters*; but then this class of neuters may be made very large, and verbs may be introduced which, if known to the Greeks and Latins, have not been formed in a separate class. Thus *to act* and *to cause to act*, may be distinguished in the verb as in the Hebrew language: and instead therefore of classing the verbs under three voices, *active, passive, and neuter*, we should perhaps look rather to the idiom of each language, and from that discover the changes made on the radix of the verb, to which if we please the name of *voice* may be applied. Thus in parts of action, where the agent may become the patient, there are evidently two states of the person. *I beat*, or *I am beaten*; which may be distinguished by the names of the *active* and the *passive voice*. *I beat myself*, the reflex voice in use among the Hebrews. *I cause to beat*, the causative voice in use in Hebrew: and there may be modifications without end in other languages, to which in a similar manner the name of *voice* may be applied. Since the English requires the use of another verb to express those states of the person which in other languages are implied by the form of the verb, this distinction of voices is superfluous, and should not be admitted into the grammar of the language.

Though the English language exceeds much in simplicity, with respect to voices, either the Latin, Greek, or Hebrew languages; yet there is an addition to the radix, which is analogous to a change in the verb of other languages, going by the name of *participles*. Of these participles we have two; in general called *participles* of the *present*, and *participles* of the *past*; *loving, loved; learning, learned*. They are called *participles* because they partake of the nature of the verb. *Loving, learning*, may be applied to persons, as may *loved, learned*, the former implying the actual existence of the quality in the person at the time spoken of; the latter that the quality had existed in the person. *He is learning English*, or *he has been learning English for some time past*. The present tense of the English language being rather an indefinite tense, this participle is also indefinite: learning in both of the above instances showing that the quality was existing in the man for an indefinite time. In the sentences, "he is loved," or, "he has been loved," the participle *loved* shows that the quality had existed in the man at a former period; "he has been loved," namely, at a distant time; "he is loved," implies that the person at the present time is one who had love, and no intimation being given that the love of him ceased to exist, it naturally follows that we presume he will continue to be beloved. In all languages the participle has thus the circumstance of time attending the quality expressed, which may belong to a person; and hence it differs from another class of words generally called *adjectives*.

CHAPTER V.

ON ADJECTIVES.

Nouns we have said are words, by which objects are denominated, and which distinguish them from one another without marking their quality; and hence as these objects have a vast variety of qualities by which they may be compared together, there must be words to express these qualities only, and these words are called *adjectives*. Thus of apples we may say, "This is a sweet apple, that a sour apple." The words *sweet* and *sour* are adjectives. Since the adjective is the word expressing the quality of some object, it can have no meaning by itself, and requires the presence or the implied presence of the substantive; and hence in some languages a change takes place in the adjective according to the nature of the substantive, which is very perplexing oftentimes to a learner. In English, agreeably to the

simplicity of its noun, there is no such change: in most other languages the adjective varies its termination according to the gender or the number of the substantive to which it is applied.

Qualities admit of intensity or remission. One apple may be four, but another may have more of that quality; and hence in some languages a distinction is made of comparison, and that by degrees, which sometimes are called the *comparative* and the *superlative* degrees. These degrees are expressed by an addition to the adjective, in English as *four, fouler, fourest*, or by applying the words *more* and *most*, as *more delightful, most delightful*; and from those different ways of expressing the same thing in the same language, it is evident that the confining of adjectives to two degrees is superfluous in the philosophy of language, and that we may expect to find some language, in which this classification does not take place. This is the case in the Hebrew language, to which of all others the English approaches nearest in simplicity. If we allowed of these degrees in general, there would be no end to the classes: if one is allowed for adjectives which denote a quality greater, there should be another for a quality less; *more delightful, less delightful*, would be two classes of the comparative, and the superlative is evidently a comparative of greater intensity.

Since adjectives express qualities, and therefore cannot be used without the substantives expressed or implied, we may now see why participles should frequently be taken for, or seem to pass into the class of adjectives. "A learned man is never esteemed by a man whose claim to distinction is founded on his wealth or his rank." In this sentence, *learned* may be considered as an adjective, because from long use the quality only is expressed without reference to time. From having learned, the man is supposed to possess a quality which distinguishes him from others, and this quality is seen when placed in opposition to others who have not had the same advantages. They are called *rude, barbarous*. Thus we say, "A rude man and a learned man are opposites;" where *rude* is acknowledged at once to be an adjective, and *learned* is considered of the same class, because it is significant only of quality without reference to time.

The name of *adverbs* is given to a class of words in most languages, such as to the words *exceedingly, awhile, olim, &c.*, and the like; and as adjectives are called the *attributes* of *substances*, these adverbs are called *attributives of the second order*, because they modify the attributes. Unfortunately in all languages a number of words is placed in this class, which strike the observer at first sight to be compound words. Thus, *notwithstanding* in the English, *pendant* in the French, are evidently compounds. *While* is a substantive, meaning time, as is *ê* of the Greeks. *Wisely* is a compound of two adjectives, and we may say, "He speaks wisely," or "He speaks like a wise man," indifferently; the use of the adverb, as it is called, giving conciseness only to the expression. This class of words was formed from the ignorance of the parts in every compound; thus if, instead of *like a wise man*, we translate the phrase into Latin, and use the word *sapienter*, this *sapienter* is immediately classed as an adverb or something distinct from the adjective or verb; yet the *er* probably has the same force with the *ly* in our own tongue.

We may modify the quality expressed by a verb or a noun various ways. A high mountain may be called, "An exceedingly high mountain;" where *exceedingly* is applied to *high*, *high like exceeding*, namely, most mountains we know. "He suffers patiently;" namely, "Like a patient man." "While the country was alarmed by spies and pretended plots, the alarmists were really attacking the lives and property of their fellow-countrymen." *While* is called an adverb, but it is a substantive; and we frequently say, "All the while, i. e. all the time;" *while* therefore means *during the time*; really is *like real men*, and is in opposition to *pretended*. In all languages therefore where this class is admitted, the student should en-

deavour to learn the force of the word not by fanciful modifications of verbs and adjectives in a variety of senses, but by learning the real meaning of the word. For our language we may shortly expect to see great improvement made in this branch of our science, as it will afford great scope for the researches of our best, and we might almost say, our only grammarian.

CHAPTER VI.

On CONJUNCTIONS, PREPOSITIONS, and INTERJECTIONS.

Conjunctions and prepositions come next in the general division of words. Conjunctions are words which are to "connect words, either two or more words in a sentence, or to make of two simple sentences one compound sentence." This is the general account: but unfortunately, we stumble at the next step without having enquired after any of these words, for these conjunctions are immediately after divided into two classes,

the one called *connective*, and the other *disjunctive*; that is, on^e class of these connecting words, instead of connecting, disjoinⁿ and so many other equally fanciful distinctions take place, that instead of following such absurdities, let us hearken to plain sober sense, whose dictates are confirmed by matter of fact and experiment. There are certain words in all languages, which by frequent repetition have lost their original form, and their meaning is not obvious. Such are the words *if*, *and*, *because*, *or*. From their meaning not being known, fanciful writers have supposed them to have no meaning at all, and that they were mere sounds to connect or disjoin, were continuative, subcontinuative, collective, &c. &c. But Mr. H. Tooke has shown us, that many of these words are the imperatives of old Saxon verbs; and the Hebrew language is a confirmation of his theory. We shall subjoin his table, which will save the trouble of many tedious metaphysical enquiries.

IF	Are the Imperatives	GIF	Of their Respective Verbs	GIFAN	To give.
AN		AN		ANAN	To grant.
UNLESS		ONLES		ONLESAN	To dismiss.
EKE		EAC		EACAN	To add.
YET		GET		GETAN	To get.
STILL		STELL		STELLAN	To put.
ELSE		ALES		ALESAN	To diminish.
THOUGH		THAFIG		THAFIGAN	To allow.
or		or		or	
THO'		THAF		THAFIAN	To boot, to superadd.
BUT		BOT		BOTAN	
BUT		BE-UTAN		BEON-UTAN	To be out.
WITHOUT		WYRTH-UTAN		WYRTHAN-UTAN	To be out.
AND		AN-AD		ANAN-AD	Dare congeriem.

LEST is the participle LESED of LESAN, to dismiss.

SINCE { SITHTHAN
SYNE
SEAND-ES
SITHTHE
or
SIN-ES } is the participle of SEON, to see.

THAT is the article or pronoun THAT.

AS is ES, a German article, meaning *it*, *that*, or *which*. And

SO is SA or so, a Gothic article of the same import with AS.

From considering the above table, and referring to a similar derivation in other languages, we have reason to believe, that there is no such separate class as conjunctions or words without meaning, to connect and disjoin, but that the connection or disjunction is to be found in the meaning of the word.

If we are right in our opinion with respect to conjunctions, we shall naturally be little inclined to admit prepositions as another class of words without meaning, to unite two "words of meaning together, which without this assistance could not coalesce." We shall look to derivation for the meaning of these words; and if we have any grounds for giving them a meaning, we shall class them accordingly. Let us try then with the supposed prepositions, *with*, *without*, *chez*, *χωρίς*, *sonder*.

With means, in all cases where it is employed, addition; *without*, the contrary. "The king of England, with the lords and commons, can make a law: without the lords and commons, cannot make a law." Join the lords and commons to the king, and his act is good: take them away, and in law-making he becomes a cypher. There is an Anglo-Saxon verb, *withan*, whose imperative is *with*; this imperative we say remains in use in what is called the preposition *with*; the other parts of the verb are obsolete. *Without* comes from the Saxon *wyrthan-utan*, *be out*. Thus in French *avec*, corresponding to our *with*, is from the imperative of *avoir* and the adjective *ce*, *have that*. *Chez* is called a preposition in French; but it is in reality a corruption

of *casa*, "a house;" *chez moi*, "at my house." *χωρίς* may very reasonably be referred to *χωρίζω*, when *sonder* of the Germans, of similar import, seems to have the same relationship to *sondern*, the verb.

THOROUGH, THOUROUGH, THOROW, THROUGH, or THRO', is no other, says *Horne Tooke*, than the Gothic substantive DAURO, or the Teutonic substantive THURUH, and, like them, means *door*, *gate*, *passage*. So that the sentence cited by him, resolved upon his principles, stands thus: "The splendid sun—JOIN his beams—genially warmeth—PASSAGE the air, (or, the air being the *passage* or *medium*)—the fertile earth." And in the same manner may we translate the preposition *through* in every instance where *through* is used in English, or its equivalent preposition in any language; as from the Latin and Italian word *porta* (in Spanish *puerta* and in French *porte*), have come the Latin and Italian preposition *per*, the French *par*, and the Spanish *por*.

UP, UPON, OVER, BOVE, ABOVE, have all, says *Horne Tooke*, one common origin and signification. In the Anglo-Saxon, UFA, UFERA, UFERMEST, are the *adjectives* ALTUS, ALTIOR, ALTISSIMUS. UFA or UFAN, *up*; comparative UFERA, *offer* or *ofer*, *over* or *upper*; superlative UFERMEST, *upmost* or *uppermost*. BEUFAN, BUFAN, ON-BUFAN, *bove*, *above*. If this be a just account of the origin of these words, the sentences in the text, where *upon*, *over*, and *above*, occur, will run thus: "The

statue stood ON HIGH a pedestal;" "the river ran HIGHER a sand;" "the sun is risen ON HIGH the hills." And here we may observe, that the mere *relation* between *standing*, *running*, &c. and *place*, is rather *inferred* from the *verb itself*, than *expressed* by a *separated word*; and the reason is obvious. For if a statue *stand*, every one knows that it must stand *on some* thing as well as *at some* time. There is therefore no *necessity*, whatever *elegance* there may be in it, for employing any word to denote that *relation*, which is commonly believed to be signified by *on*; but it is *necessary* to insert, between the *verb* and *pedestal*, a word significant of *place*, that *pedestal* may not be mistaken, by an ignorant person, for a *portion of time*, or any thing else connected with the *standing of the statue*.

Hence we may see the absurdity of a sentence given sometimes by our judges. The man shall stand in and upon the pillory: by which they do not mean two distinct placings of the convict, though the words themselves do; but this is one only out of the thousand instances of the absurdity in the courts of law, of giving sanction to an absurd precedent, instead of correcting every absurdity the moment it is detected.

Having thus restored meaning to our prepositions and conjunctions, we come to the last part of the general division of words in modern grammars, to the class of *interjections*, on which we shall make use of good authority. "The neighing of a horse, the lowing of a cow, the barking of a dog, the purring of a cat, sneezing, coughing, groaning, shrieking, and every other involuntary convulsion and oral sound, have almost as good a title to be called parts of speech as *interjections*. In the intercourse of language, *interjections* are employed only when the suddenness or vehemence of some affection or passion returns men to their natural state, and makes them for a moment forget the use of speech: or when, for some circumstance, the shortness of time will not permit them to exercise it." It is pleasant to observe, what curious words, nay sentences, are placed by writers in the class of *interjections*. Thus Dr. Beattie ranks *strange*, *prodigious*, *amazing*, *dear me*, in this class; and we may go on with this author in making a pretty list. Thus *God damn you* is an infamous *interjection* common to the English, but it still is a sentence. *Od's blood and ounds* is used by many with little meaning, though the phrase has a very strong meaning, and was introduced into common use by the ignorance and folly of our forefathers, who supposed that *God* could have *blood and wounds*. In general the *interjections* are inarticulate sounds, which have nothing to do with speech, and may be significant of *pleasure* or *pain*, *surprise*, &c. A *laugh*, or a *sbriek*, or a *sneeze*, will intervene in conversation: but they cannot, either of them, come into any division of words.

Upon the whole then we may observe of *grammar*, that as a science it is at present very defective: instead of making an intimate acquaintance with a variety of languages the basis of a general theory, most writers have employed themselves in

what are called metaphysical disquisitions, and the result of their speculations has been frequently contradicted by a plain reference to matter of fact in the languages with which they were unacquainted. It seems natural to suppose, that language in its origin must have been very imperfect: that signs were frequently used to give signification to men's words, just as difference of the tone of the voice makes now a difference in the meaning of the same sentence. Objects in nature were first expressed by certain sounds; qualities were observed in them which were imitated by sounds, as the hissing of the snake: words were connected together into sentences, and after a considerable length of time, words which occurred very frequently suffered abbreviation. Hence imperfect ideas were annexed to many words; the art of speech was abused: it frequently did not convey the ideas of the speaker, and was intended to deceive the hearer.

As most knowledge is communicated by language, it is evidently incumbent that the principles of it should be well understood: and hence the first requisite is to instruct the learner in the meaning of every word, and to shew how, by various processes, it came to lose some part of its original meaning, to have more or fewer ideas annexed to it. This is not a trifling knowledge in itself; when we consider that the perfect knowledge of any science will imply a knowledge of all the objects with which that language is conversant; and an accuracy and precision in the thoughts of every educated man will be the consequence of the first principles of his education. But there are many obstacles to the promotion of this science, among which we do not know a greater than the practice of the law at present in England. In this profession there is an affectation of accuracy in the use of words; but, from the want of studying the principles of language, by a multiplicity of words, oftentimes of a contradictory nature, the judges and barristers envelop a plain matter in the utmost obscurity. This obscurity is increased by the retaining of antient laws, which ought to be modernized: by paying the profession according to the number of words employed, instead of the judgment and mode of sagacity exercised. We might add, that the drawing up acts of parliament must necessarily injure our language: they should not be intrusted to a technical lawyer, but to a master of language. Moliere's housekeeper would be a better judge of the propriety of a sentence than a lord chief justice.

To understand the theory of language, then, we must do as in other sciences, make experiment the basis of our proceedings. We must not make distinctions in our language, because such are necessary in another. We must attend to the structure of each particular language, and from combining together the various facts in which they all agree, we may at last form our notions into principles, and lay the foundation of UNIVERSAL GRAMMAR.

G R A

GRAMMARIAN, one that is skilled in or teaches grammar. Anciently the name *grammarian* was a title of honour, literature, and erudition, being given to persons accounted learned in any art or faculty whatever. But it is otherwise now, being frequently used as a term of reproach, to signify a dry plodding person, employed about words and phrases, but inattentive to the true beauties of expression and delicacy of sentiment. The ancient grammarians, called also *philologists*, must not be confounded with the grammatists, whose sole business was to teach children the first elements of language. Varro, Cicero, Meffala, and even Julius Caesar, thought it no dishonour

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to be ranked grammarians, who had many privileges granted to them by the Roman emperors.

GRAMMONT, a town of France, in the department of Upper Vienne and late province of Limosin, remarkable for its late abbey, which was the chief of the order. It is 15 miles N. E. of Limoges. Lon. 1. 30. E. Lat. 46. 1. N.

GRAMMONT, a town of Austrian Flanders, seated on the river Dender, 18 miles N. E. of Tournay, and 17 S. E. of Ghent. Lon. 3. 59. E. Lat. 50. 47. N.

GRAMPIAN-HILLS; a chain of high mountains in Scotland, which run from east to west almost the whole breadth of

the kingdom. They take their name from only a single hill, the *Mons Grampius* of Tacitus, where Galgacus waited the approach of Agricola, and where the battle was fought so fatal to the brave Caledonians.

GRAMPOUND, a small borough in Cornwall, with a market on Saturday. It is seated on the river Valles, and the inhabitants have a considerable manufacture of gloves. It is 46 miles S. W. of Launceston, and 244 W. by S. of London. Lon. 4. 49. W. Lat. 50. 22. N.

GRAMPUS, in ichthyology; a species of delphinus. See **DELPHINUS**.

GRANADA, a province of Spain, bounded on the N. and W. by Andalusia, on the E. by Murcia, and on the S. by the Mediterranean Sea. It is about 175 miles in length, and 75 in breadth; is a mountainous country, and yet the soil is good; but it has not been well cultivated since the Moors were expelled from it in 1492. However, it produces corn, wine, oil, sugar, flax, hemp, excellent fruits, honey, wax, grapes, and mulberry-trees, which feed a great number of silk-worms. The forests produce gall-nuts, palm-trees, and oaks. Granada is the capital.

GRANADA, a large, handsome, and delightful city of Spain, capital of the kingdom of Granada, with an archbishop's see, and a university. It is built on four hills, and divided into four parts, in one of which is the large church, containing the tombs of Ferdinand and Isabella, who took this place from the Moors in 1492. In another is a palace of the kings of Spain, and an ancient palace of the Moorish kings, with so many rooms, that it is like a labyrinth; in the third the university stands; the fourth has nothing considerable: but all the public buildings are very magnificent. It is seated not far from the river Oro, near its confluence with the Xenil, 125 miles S. W. of Murcia, and 225 S. of Madrid. Lon. 3. 30. W. Lat. 37. 8. N.

GRANADA, an island in the W. Indies, the principal of the Granadillas, or Granadines, situated in 61. 40. W. lon. and between 11. 55. and 12. 23. N. lat. It is the last of the Windward Caribbees, and is 30 leagues to the N. W. of Tobago. The chief port, called Lewis, is on the W. side, and is very spacious. This island is finely wooded; and the soil is suited to produce sugar, tobacco, and indigo. It was taken from the French in 1762, confirmed to the English in 1763, taken by the French in 1779, and restored to the English in 1783.

GRANADA, a town of N. America, in the province of Nicaragua, seated on lake Nicaragua, 70 miles from the South Sea. It was taken twice by the French buccaneers, and pillaged. The inhabitants carry on a great trade by means of the lake, which communicates with the Atlantic Ocean. Lon. 87. 0. W. Lat. 11. 28. N.

New GRANADA, a province of S. America, in Terra Firma, about 75 miles in length, and as much in breadth. It is bounded on the N. by Cartagena and St. Martha, on the E. by Venezuela, on the S. by Popayan, and on the W. by Darien. It contains mines of gold, copper, and iron; horses, mules, good pastures, corn, and fruits. Santa-Fé-de-Bagota is the capital.

GRANADILLOES, the name of some islands of the Caribbees, in America, having St. Vincent to the north and Granada to the south. They are so inconsiderable that they are quite neglected; but were ceded to England by the treaty of peace in 1763.

GRANADIER, a soldier armed with a firelock, a bayonet, and, occasionally, a pouch full of hand-granadoes. They wear high caps, are generally the tallest and briskest fellows, and are always the first upon all attacks. Every battalion of foot has generally a company of granadiers belonging to it; or else four or five granadiers belong to each company of the battalion, which, on occasion, are drawn out, and form a company of themselves. These always take the right of the battalion.

GRANADO or **GRENADÉ**, in the art of war, a hollow ball or shell of iron or other metal, of about 2½ inches diameter, which being filled with fine powder, is set on fire by means of a small fuse made of well-seasoned beech-wood, driven into the fuse-hole, and thrown by the grenadiers into those places where the men stand thick, particularly into the trenches and other lodgements made by the enemy. As soon as the composition within the fuse gets to the powder in the granado, it bursts into many pieces, greatly to the damage of all who happen to be in its way. Granadoes were invented about the year 1594. The author of the Military Dictionary has the following remark on the use of granadoes. "Grenades have unaccountably sunk into disuse; but I am persuaded there is nothing more proper than to have grenades to throw among the enemy who have jumped into the ditch. During the siege of Cassel under the Count de La Lippe, in the campaign of 1762, a young engineer undertook to carry one of the outworks with a much smaller detachment than one which had been repulsed, and succeeded with ease from the use of grenades; which is a proof that they should not be neglected, either in the attack or defence of posts."—The word Granado takes its rise from hence, that the shell is filled with grains of powder, as a pomegranate is with kernels.

GRANARD, a borough, market, fair, and post town in the county of Longford, province of Leinster; it gives title of earl to the family of Forbes; situated 52 miles from Dublin, and about 16 north east of Longford. N. lat. 53. 44. W. long. 7. 30.

GRANARY, a building to lay or store corn in, especially that designed to be kept a considerable time. Sir Henry Wotton advises to make it look to the north, because that aspect is the coolest and most temperate. Mr. Worlidge observes, that the best granaries are built of brick, with quarters of timber wrought in the inside, to which the boards may be nailed, with which the inside of the granary must be lined so close to the bricks, that there may not be any room left for vermin to shelter themselves. There may be many stories one above another, which should be near the one to the other; because the shallower the corn lies, the better it is, and more easily turned.

The two great cautions to be observed in the erecting of granaries are, to make them sufficiently strong, and to expose them to the most drying winds. The ordering of the corn in many parts of England, particularly in Kent, is thus: To separate it from dust and other impurities after it is thrashed, they toss it with shovels from one end to the other of a long and large room; the lighter substances fall down in the middle of the room, and the corn only is carried from side to side, or end to end of it. After this they screen the corn, and then bringing it into the granaries, it is spread about half a foot thick, and turned from time to time about twice in a week; once a week they also repeat the screening it. This sort of management they continue about two months, and after that they lay it a foot thick for two months more; and in this time they turn it once a week, or twice if the season be damp, and now and then screen it again. After about five or six months they raise it to two feet thickness in the heaps, and then they turn it once or twice in a month, and screen it now and then. After a year, they lay it two and a half or three feet deep, and turn it once in three weeks or a month, and screen it proportionably. When it has lain two years or more, they turn it once in two months, and screen it once a quarter; and how long soever it is kept, the oftener the turning and screening is repeated, the better the grain will be found to keep.—It is proper to leave an area of a yard wide on every side of the heap of corn, and other empty spaces, into which they turn and toss the corn as often as they find occasion. In Kent they make two square holes at each end of the floor, and one round in the middle, by

means of which they throw the corn out of the upper into the lower rooms, and so up again, to turn and air it the better. Their screens are made with two partitions, to separate the dust from the corn, which falls into a bag, and when sufficiently full this is thrown away, the pure and good corn remaining behind. Corn has by these means been kept in our granaries 30 years; and it is observed, that the longer it is kept the more flour it yields in proportion to the corn, and the purer and whiter the bread is, the superfluous humidity only evaporating in the keeping. At Zurich in Swisserland, they keep corn 80 years, or longer, by the same sort of methods.

The public granaries at Dantzick are seven, eight, or nine stories high, having a funnel in the midst of every floor to let down the corn from one to another. They are built so securely, that though every way surrounded with water, the corn contracts no damp, and the vessels have the convenience of coming up to the walls for their lading. The Russians preserve their corn in subterranean granaries of the figure of a sugar-loaf, wide below and narrow at top: the sides are well plastered, and the top covered with stones. They are very careful to have the corn well dried before it is laid into these storehouses, and often dry it by means of ovens; the summer dry weather being too short to effect it sufficiently.—Dantzick is the grand storehouse or repository of all the fruitful kingdom of Poland. The wheat, barley, and rye, of a great part of the country, are there laid up in parcels of 20, 30, or 60 lasts in a chamber, according to the size of the room; and this they keep turning every day or two, to keep it sweet and fit for shipping. A thunder storm has sometimes caused very terrible consequences to these stores. All the corn of the growth of former years having been found so much altered by one night's thunder, that though over night it was dry, fit for shipping or keeping, and proper for uses of any sort, yet in the morning it was found clammy and sticking. In this case there is no remedy but the turning of all such corn three or four times a day for two months or longer; in which time it will sometimes come to itself, though sometimes not. This effect of thunder and lightning is only observed to take place in such corn as is not a year old, or has not sweated thoroughly in the straw before it was threshed out. The latter inconvenience is easily prevented by a timely care: but as to the former, all that can be done is carefully to examine all stores of the last year's corn after every thunder storm, that if any of this have been so affected, it may be cured in time; for a neglect of turning will certainly utterly destroy it.

According to Vitruvius's rules, a granary should always be at the top of a house, and have its openings only to the north or east, that the corn may not be exposed to the damp winds from the south and west, which are very destructive to it; whereas the contrary ones are very necessary and wholesome to it, serving to cool and dry it from all external humidity, from whatever cause. There must also be openings in the roof to be set open in dry weather, partly to let in fresh air, and partly to let out the warm effluvia which are often emitted by the corn. The covering of the roofs should always be of tiles, because in the worst seasons, when the other openings cannot be safe, there will always be a considerable inlet for fresh air, and a way out for the vapours by their joinings, which are never close. If there happen to be any windows to the south, great care must be taken to shut them up in moist weather, and in the time of the hot southern winds. There must never be a cellar, or any other damp place under a granary, nor should it ever be built over stables; for in either of these cases the corn will certainly suffer by the vapours, and be made damp in one, and ill-tasted in the other.

M. Du Hamel and Dr. Hales recommend various contrivances for ventilating or blowing fresh air through corn laid up in granaries or ships, in order to preserve it sweet and dry, and to

prevent its being devoured by weevils or other insects. This may be done by nailing wooden bars or laths on the floor of the granary about an inch distant from each other, when they are covered with hair-cloth only; or at the distance of two or three inches, when coarse wire-work, or basket-work of osier is laid under the hair-cloth, or when an iron plate full of holes is laid upon them. These laths may be laid across other laths, nailed at the distance of 15 inches, and two or more deep, that there may be a free passage for the air under them. The under laths must come about six inches short of the wall of the granary at one end of them; on which end a board is to be set edgeways, and sloping against the wall: by this disposition a large air-pipe is formed, which, having an open communication with all the interstices between and under the bars, will admit the passage of air below forcibly through a hole at the extremity of it, into all the corn of the granary, that will consequently carry off the moist exhalations of the corn. The ventilators for supplying fresh air may be fixed against the wall, on the inside or outside of the granary, or under the floor, or in the ceiling; but wherever they are fixed, the handle of the lever that works them must be out of the granary, otherwise the person who works them would be in danger of suffocation, when the corn is smothered with burning brimstone, as is sometimes done for destroying weevils. Small moveable ventilators will answer the purpose for ventilating corn in large bins in granaries, and may be easily moved from one bin to another. If the granary or corn ship be very long, the main air-pipe may pass lengthwise along the middle of it, and convey air, on both sides, under the corn. In large granaries, large double ventilators, laid on each other, may be fixed at the middle and near the top of the granary, that they may be worked by a wind-mill fixed on the roof of the building, or by a water-mill. The air is to be conveyed from the ventilators through a large trunk or trunks, reaching down through the several floors to the bottom of the granary, with branching trunks on each floor, by means of which the air may be made to pass into a large trunk along the adjoining cross walls: from these trunks several lesser trunks, about four inches wide, are to branch off, at the distance of three or four feet from each other, which are to reach through the whole length of the granary, and their farther ends are to be closed: seams of $\frac{1}{16}$ or $\frac{1}{8}$ of an inch are to be left open at the four joinings of the boards, where they are nailed together, that the air may pass through them into the corn. In some of these lesser trunks there may be sliding shutters, in order to stop the passage of the air through those trunks which are not covered with corn; or to ventilate one part of the granary more briskly than others, as there may be occasion. There must also be wooden shutters, hung on hinges at their upper part; so as to shut close of themselves; these must be fixed to the openings in the walls of the granary on their outside: by these means they will readily open to give a free passage for the ventilating air, which ascends through the corn, to pass off, but will instantly shut when the ventilation ceases, and thereby prevent any dampness of the external air from entering: to prevent this, the ventilation should be made only in the middle of dry days, unless the corn, when first put in, is cold and damp.

In lesser granaries, where the ventilators must be worked by hand, if these granaries stand on staddles, so as to have their lowest floor at some distance from the ground, the ventilators may be fixed under the lowest floor, between the staddles, so as to be worked by men standing on the ground, without or within the granary. A very commodious and cheap ventilator may be had for small granaries, by making a ventilator of the door of the granary; which may be easily done by making a circular screen, of the size of a quarter of a circle, behind the door: but in order to this, the door must open, not inwards but outwards of the granary, so that, as it falls back, it may be

worked to and fro in the screen; which must be exactly adapted to it in all parts of the circular side of the screen, as well as at the top and bottom. But there must be a stop at about eight or ten inches distance from the wall, to prevent the door's falling back farther; that there may be room for a valve in the screen to supply it with air: which air will be driven in by the door, through a hole made in the wall near the floor, into the main air-trunk, in which there must be another valve over the hole in the wall, to prevent the return of the air.

The *preservation of grain* from the *ravages of insects* may be best effected by timely and frequent screening, and ventilation: as little or no inconvenience will follow corn or malt lodged dry, but what evidently results from a neglect of these precautions. For, whether the obvious damage arise from the weevil, the moth, or the beetle, that damage has ceased at the time the vermin make their appearance under either of these species, they being, when in this last state of existence, only propagators of their respective kinds of vermiculi; which, while they continue in that form, do the mischief.

In this last or insect state, they eat little, their principal business being to deposit their ova (eggs), which unerring instinct prompts them to do where large collections of grain furnish food for their successors while in a vermicular state. It is therefore the farmer's business to prevent future generations of these ravagers, by destroying the eggs previous to their hatching; and this is best accomplished by frequent screening, and exposure to draughts of wind or fresh air. By frequently stirring the grain, the cohesion of their ova is broken, and the nidus of those minute worms is destroyed, which on hatching collect together, and spin or weave numerous nests of a cobweb-like substance for their security. To these nests they attach, by an infinity of small threads, many grains of corn together, first for their protection, and then for their food. When their habitations are broken and separated by the screen, they fall through its small interstices, and may be easily removed from the granary with the dust. Those that escape an early screening will be destroyed by subsequent ones, while the grain is but little injured; and the corn will acquire thereby a superior purity. But by inattention to this, and sometimes by receiving grain already infested into the granary, these vermin, particularly the weevils, will in a short time spread themselves in that state every where upon its surface, and darken even the walls by their number. Under such circumstances a hen or hens, with new hatched chickens, if turned on the heap, will traverse, without feeding (or very sparingly so) on the corn, wherever they spread; and are seemingly insatiable in the pursuit of these insects. When the numbers are reduced within their reach, a hen will fly up against the walls, and brush them down with her wings, while her chickens seize them with the greatest avidity. This being repeated as often as they want food, the whole species will in a day or two be destroyed. Of the phalæna (moth), and the small beetle, they seem equally voracious: on which account they may be deemed the most useful instruments in nature for eradicating these noxious and destructive vermin.

GRANATE, or GARNET; a genus of fossils ranked among the siliceous earths; but, according to M. Magellan, analogous to gems, all of them being composed of the siliceous, argillaceous, and calcareous earths, with a greater or less proportion of iron. The opaque and black garnets contain about a fifth part of iron; but the diaphanous ones only $\frac{1}{16}$ th, according to Bergman. The garnets, properly so called, contain a greater quantity of siliceous earth than the shirls, and both are now justly ranked with the siliceous earths. The general properties of the garnet, according to Cronstedt, are as follow: 1. It is more fusible, as it contains less metallic matter, and is more transparent or glassy in its texture. 2. Mixed with salt of kelp, it may on a piece of charcoal be converted into glass by the blow-

pipe, which cannot be done with flint. 3. The most transparent garnet may, without any addition, be brought to a black opaque slag by the same means. 4. It is never, as far as is hitherto known, found pure, or without some mixture of metal, especially iron, which may be extracted by the common methods. 5. The garnet matter, during the crystallization, has either been formed in small detached quantities, or else has had the power of shooting into crystals, though closely confined in different substances: since garnets are generally found dispersed in other solid stones, and oftentimes in the harder ones, such as quartz and chert. Fabroni informs us, that the garnet is easily melted by means of borax or the vegetable alkali. Its specific gravity is greater than that of the precious stones; viz. from 3600, and even from 4400 to 5000. According to Brunich, most of the garnets strike fire with steel.

Cronstedt observes, that the metallic calces, when mixed with other earthy substances, make great alteration in their fusibility; iron, for instance, in the argillaceous and micaceous earths, renders them fusible, though otherwise they are not so. Hence there may be some reasons for considering the garnet as a quartz impregnated with iron; yet on the whole he thinks it will be better to call the garnet a stone of a different order, until we have experiments sufficient to warrant us to reduce the number of earths. The garnet earth is never found but in an indurated state, and is divided into the garnet properly so called, and shirl or cockle; though this perhaps is owing more to the figure of their crystals than any thing else. The *species* are,

1. The *granatus*, or coarse-grained garnet; a heavy hard stone, crystallizing in form of polygonal balls, mostly of a red or reddish brown colour. It is found of a reddish brown and whitish or pale yellow, in different parts of Sweden.

2. The *granatus crystallizatus*, or crystallized garnet, is reckoned among the precious stones, but varying in its colour and form of its crystal more than any of them. Sometimes it is of a deep and dark red colour; sometimes yellowish or purplish; sometimes brown, black, or opaque. It is inferior both in lustre and hardness to the other gems, yielding to the file, although it will strike fire with steel. The crystals are sometimes irregular, but frequently assume rhomboidal, tetradecahedral, and almost all other regular forms.

Wallerius makes the specific gravity of the garnet from 3600 to 3900, and even 4400; Brissen makes it 4100; and Cotes says that the garnets of Bohemia are 4360, those of Sweden being 3978. The most esteemed is the Syrian garnet; which is of a fine red, inclining to purple, very transparent, but less beautiful than the oriental amethyst. This, according to Magellan, is the amethystizans of Pliny; and is found in Syria, Calcutta, Cananor, Cambaya, and Ethiopia. The forams of the ancients was another kind of garnet of a red colour inclining to yellow, called *vermeille* by the French, and *giacinto guarnacino* by the Italians; the former having the name of *rubine di rocca* among the last-mentioned people. The name *Soranus* comes from Sorian or Surian, a town of Pegu, from whence these gems are brought.

Sometimes the garnets have a yellow colour, in which case they obtain the name of *hyacinths*. Like other gems, they are divided into oriental and occidental; but this means in fact no more than *more or less* valuable; the finest stones being always called *oriental*, wherever they come from. Some very fine ones are found in Bohemia; they are also met with in Hungary, at Pyrna in Silesia, S. Sapho in the canton of Berne in Switzerland, in Spain, and in Norway. Their colour is supposed to proceed from iron; and, according to M. Saussure, even the finest oriental garnets attract the magnetic needle at a small distance. In the focus of a good burning-glass the garnet melts into a brown mass, which is attracted by the magnet; which shows that iron enters into its composition in a considerable pro-

portion. Some garnets, however, contain a little gold; and some, called by the Germans *zingraupen*, contain tin. M. Magellan is of opinion, that the *lapis alabandicus* of Pliny, and another gem which he mentions of a deep purple, were both true garnets.

3. The *cockle* or *shirl*. See COCKLE. The garnets abound so much with iron that they are sometimes worked with profit as ores of that metal; in which case no notice is taken of the natural character of the stone, in the same manner as is done with clays and jaspers that contain iron; for in these the quantity of metal is gradually augmented, until at last they acquire the appearance of iron itself. The greatest part of this genus, however, contain only from six to twelve *per cent.* of iron, which is too poor to be worked any where with advantage as an ore of that metal. When any of the garnet kind are to be tried for the metal they contain, the iron ought to be melted out of them by the common process; and if the garnet at the same time contains tin or lead, these will likewise be included in the iron. They may be extracted out of it, however, by a heat gradually augmented; the lead and tin sweating out in form of drops, though always somewhat mixed with iron. None of the garnet kind have yet been found in the form of an earth properly so called; though at Swappawari in Lapland, there is found a bole which has the same figure with the garnet; and the hornblende of the Swedes, which is somewhat harder than this bole, has often the appearance of a cockle.

GRANATE-Paste. See GARNET.

GRAND, a term rather French than English, though used on many occasions in our language. It has the same import with *great*, being formed of the Latin *grandis*. In this sense we say, the grand-master of an order, the grand-master of Malta, of the free masons, &c. So also the grand-signor, the grand-vizir, &c. grand-father, grand-mother, &c. In the former French polity and customs there were several officers thus denominated, and from their example, we retain the English titles; grand almoner, grand ecuyer, grand jury, &c.

GRAND-Affize. See ASSISE.

GRAND *Distress*, *districcio magna*, in English law, a writ of distress, so called on account of its extent, which reaches to all the goods and chattels of the party within the county. This writ lies in two cases: either when the tenant or defendant is attached and appears not, but makes default; or where the tenant or defendant hath once appeared, and after makes default. On such occasions, this writ lies by common law, in lieu of a petit cape.

GRAND *Gusto*, among painters, a term used to express that there is something in the picture very great and extraordinary, calculated to surprise, please, and instruct. Where this is found, they say, the painter was a man of *grand gusto*; and they use the words *sublime* and *marvellous*, when they speak of a picture, in much the same sense.

GRAND Jury, *larceny*, *serjeantry*, &c. See JURY, &c.

GRANDEE, is understood of a lord of the first rank or prime quality. In Spain, the term *grandees* is used absolutely to denote the prime lords of the court, to whom the king has once given leave to be covered in his presence: there are some grandees for life only; made by the king's saying simply, Be covered. Others are grandees by descent; made by the king's saying, Be covered for thyself and heirs. These last are reputed far above the former. Some have three or four grandeeships in their family.

GRANDGOR, a term once used in Scotland to signify the pox. In the Philosophical Transactions, n^o 469. sect. 5. is a proclamation of king James IV. of Scotland, ordering all who had this disease, or who had attended others under it, forthwith to repair to an island in the Frith of Forth. If the grandgor was the pox, and this distemper came into Europe at the siege of Naples in 1495, it must have made a very quick progress to cause such an alarm at Edinburgh in 1497.

GRANGE, an ancient term for a barn or place wherein to lay up and thrash corn. The word is formed of the Latin *grana*: or of *grammum*, "grain, corn," &c. Hence also *granger* or *grangier*, "a grange-keeper or farmer." This term has been also used, in a more extensive sense, for a whole farm, with all the appendages of stables for horses, stalls for cattle, &c. and for an inn.

GRANI, in our ancient writers, mustachoes or whiskers of a beard. The word seems formed from the ancient British or Irish *greann*, a beard. It is given for a reason why the cup is refused to the laity, *Quia barbati, & prolixos habent granos, dum poculum inter epulas sumunt, prius liquore pilos inficiunt, quam ori infundunt.*

GRANICUS, a small river near the Hellespont in Lesser Asia, remarkable for the first victory gained by Alexander the Great over the armies of Darius.

GRANITE, in natural history, a distinct genus of stones, composed of separate and very large concretions rudely compacted together; of great hardness, giving fire with steel, not fermenting with acids, and slowly and imperfectly calcinable in a great fire. Of this genus there are three *species*: 1. The hard *white* granite, with black spots, commonly called *moor-stone*. This is a very valuable kind, consisting of a beautiful congeries of very variously constructed and differently coloured particles, not diffused among or running into one another, but each pure and distinct, though firmly adhering to whichever of the others it comes in contact with, and forming a very firm mass. It is much used in London for the steps of public buildings, and on other occasions where great strength and hardness are required. 2. The hard *red* granite variegated with black and white, and common in Egypt and Arabia. 3. The *pale* *whitish* granite, variegated with black and yellow. This is sometimes found in strata, but more frequently in loose nodules, and is used for paving the streets.

Some of these kinds of stones are found in almost every country, and in many places they are found of immense bigness. The largest mass of this kind in the known world, lying as an unconnected stone, is found near the Cape of Good Hope in Africa, and of which we have the following description in the Philosoph. Transact. vol. 68. p. 102, given by Mr. Anderson in a letter to Sir John Pringle. "The stone is so remarkable, that it is called by the people here the *Tower of Babel*, and by some the *Pearl Diamond*. It either takes the last name from a place near which it is situated, or it gives name to the tract of cultivated land called the Pearl. It lies upon the top of a ridge of low hills, beyond a large plain, at the distance of about thirty miles from the Cape Town; beyond which, at a little distance, is a range of hills of a much greater height. It is of an oblong shape, and lies north and south. The south end is highest: the east and west sides are steep and high; but the top is rounded, and slopes away gradually to the north end, so that you can ascend it by that way, and enjoy a most extensive prospect of the whole country. I could not precisely determine its circumference, but it took us above half an hour to walk round it; and by making every allowance for the rugged way, and stopping a little, I think the most moderate computation must make it exceed half a mile. The same difficulty occurred with respect to knowing its height: but I think, that, at the south end, it is nearly equal to half its length: or, were I to compare it to an object you are acquainted with, I should say it equalled the dome of St. Paul's church.

"I am uncertain whether it ought to be considered as the top of the hill, or a detached stone, because there is no positive proof of either, unless we were to dig about its base; but it would certainly impress every beholder, at first sight, with the idea of its being one stone, not only from its figure, but because it is really one solid uniform mass from top to bottom, without

any interruption; which is contrary to the general character of the high hills of this country, they being commonly divided, or composed of different strata, at least if we may judge from the rows of plants or shrubs which grow on the sides of the steepest, and, as I suppose, are produced from the small quantity of earth interposed between them. It has indeed a few fissures, or rather impressions, which do not reach deeper than four or five feet; and near its north end a stratum of a more compact stone runs across, which is not above twelve or fourteen inches thick, with its surface divided into little squares, or oblongs, disposed obliquely. This stratum is perpendicular; but whether it cuts the other to its base, or is superficial, I cannot determine. Its surface is also so smooth, that it does not appear to have formerly been joined to, or separated from, any other part by violence, as is the case with many other large fragments; but enjoys the exact situation where it was originally placed, and has undergone little change from being exposed for so many successive ages to the calcining power of a very hot climate."—A part of this stone being examined by Sir William Hamilton, he determined it to be a granite, and of the same nature with the tops of some of the Alps; and supposes both of them to have been elevated by volcanic explosions.

GRANITE, a genus of stones of the order of petræ, belonging to the class of saxa. The principal constituent parts of this stone are felt-spar or rhombic quartz, mica, and quartz. These ingredients constitute the hardest sort of granite, and that most anciently known. That into which schoerl enters is more subject to decomposition. They never have any particular texture or regular form, but consist of enormous shapeless masses extremely hard. In the finer granites the quartz is transparent; in others generally white or grey, violet or brown. The felt-spar is generally the most copious ingredient, and of a white, yellow, red, black, or brown colour. The mica is also grey, brown, yellow, green, red, violet, or black; and commonly the least copious. The schoerl is generally black, and abounds in the granites that contain it. Hence the colour of the granites depends principally on that of the spar or schoerl. The red granites consist commonly of white quartz, red felt-spar, and grey mica; the grey ones of white quartz, grey or violet felt-spar, and black mica. The black granites commonly contain schoerl instead of felt-spar; and the green usually contain green quartz.

On exposing granite to the flame of a blow-pipe, the component ingredients separate from one another. Mr. Gerhard having melted some in a crucible, found the felt-spar run into a transparent glass; below it the mica lay in form of a black slag, the quartz remaining unaltered. It melted somewhat better when all the three were powdered and mixed together; though even then the quartz was still discernible by a magnifying glass. Hence we may explain the reason why grains of a white colour are sometimes found in volcanic lavas. The mixture of mica prevents the flint or quartz from splitting or cracking; and hence its infusibility and use in furnace-building.

Granites are seldom flaty or laminated. In those which are of a close texture, the quartz and schoerl predominate. They take a good polish; for which reason the Egyptians formerly, and the Italians still work them into large pieces of ornamental architecture, for which they are extremely fit, as not being liable to decay in the air. Farber, in his letters from Italy, mentions a kind of stone named *granitone*, composed of felt-spar and mica: "a substance of this kind, which moulders in the air, is found in Finland; which is said to contain nitre, and sometimes common salt. In that country it is called *rapakiri*. Wallerius describes 18 species of granites, besides many others akin to this genus. Those described by Cronstedt are, 1. Loose or friable, which comes from France, and is used at the

brass-works for casting that metal in. 2. Hard or compact, of which there are two varieties, red and grey. The former is met with of two kinds; viz. fine-grained from Swappari in Lapland, or coarse-grained from the province of Dalarne in Sweden. The grey, with other colours, is met with on the coast round Stockholm and Norland in Sweden.

GRANITELLO, a genus of stones of the order of petræ, belonging to the class of saxa. There are two species, 1. That composed of distinct particles, found in several of the mountainous parts of Sweden. In some of these there is a predominance of quartzose particles, in others of micaceous; in which last case the stone is flaty, and easily split. 2. Granitello, composed of convoluted particles. This is met with of different colours, as whitish grey, greenish, and reddish. Both these kinds of stone are used in building furnaces, on account of the powerful resistance they make to the fire; but the latter is preferable to the other, on account of its containing a little of a refractory clayish substance. It is likewise of great use in mills, where the fellow is a coarse sand-stone.

GRANIVOROUS, an appellation given to animals which feed on corn or seeds. These are principally of the bird kind.

GRANT, in law, a conveyance in writing of such things as cannot pass or be conveyed by word only; such are rents, reversions, services, &c.

GRANTHAM, a borough of Lincolnshire, with a market on Saturday. It is seated on the river Witham, and has a free-school, and a handsome church famous for its high spire, which seems to lean on one side. It is 21 miles N. by W. of Stamford, and 110 N. by W. from London. Lon. 0. 36. W. Lat. 52. 59. N.

GRANVILLE (George), lord Lansdowne, was descended from a very ancient family, derived from Rollo the first duke of Normandy. At eleven years of age he was sent to Trinity College in Cambridge, where he remained five years: but at the age of 13 was admitted to the degree of master of arts; having, before he was 12, spoken a copy of verses of his own composition to the duchess of York at his college, when she paid a visit to the University of Cambridge. In 1696 his comedy called the *Sbe-gallants* was acted at the theatre-royal in Lincoln's-inn-fields, as his tragedy called *Heroic Love* was in the year 1698. In 1702 he translated into English the *second Olynthian of Demosthenes*. He was member for the county of Cornwall in the parliament which met in 1740; was afterwards secretary at war, comptroller of the household, then treasurer, and sworn one of the privy-council. The year following, he was created baron Lansdowne. On the accession of king George I. in 1714, he was removed from his treasurer's place; and the next year entered his protest against the bills for attainting lord Bolingbroke and the duke of Ormond. He entered deeply into the scheme for raising an insurrection in the west of England; and being seized as a suspected person, was committed to the Tower, where he continued two years. In 1719 he made a speech in the house of Lords, against the bill to prevent occasional conformity. In 1722 he withdrew to France, and continued abroad almost ten years. At his return in 1732, he published a fine edition of his works in 2 vols. quarto. He died in 1735, leaving no male issue.

GRANVILLE, a seaport of France, in the department of the Channel and late province of Normandy, partly seated on a rock, and partly on a plain. It is 15 miles S. by E. of Coutances, and 185 W. of Paris. Lon. 1. 32. W. Lat. 48. 50. N.

GRANULATION, in chemistry, an operation by which metallic substances are reduced into small grains, or roundish particles; the use of which is, to facilitate their combination with other substances.—This operation is very simple; it consists only in pouring a melted metal slowly into a vessel filled

with water, which is in the mean time to be agitated with a broom. With melted copper, however, which is apt to explode with great violence on the contact of water, some precautions are to be observed. Lead or tin may be granulated by pouring them when melted into a box; the internal surface of which is to be rubbed with powdered chalk, and the box strongly shaken till the lead has become solid. Metals are granulated, because their ductility renders them incapable of being pounded, and because filing is long and tedious, and might render the metal impure by an admixture of iron from the file.

GRAPE, the fruit of the vine. See VINE and WINE. See also CURRANT and RAISIN.

GRAPE-Shot, in artillery, is a combination of small shot, put into a thick canvas bag, and corded strongly together, so as to form a kind of cylinder, whose diameter is equal to that of the ball adapted to the cannon. The number of shot in a grape varies according to the service or size of the guns: in sea-service nine is always the number; but by land it is increased to any number or size, from an ounce and a quarter in weight to three or four pounds. In sea-service the bottoms and pins are made of iron, whereas those used by land are of wood.

GRAPES, in the manege, a term used to signify the arrests or mangy tumours that appear on the horse's legs.

GRAPHOMETER, a mathematical instrument, otherwise called a *Semicircle*; the use of which is to observe any angle whose vertex is at the centre of the instrument in any plane (though it is most commonly horizontal, or nearly so), and to find how many degrees it contains. See GEOMETRY.

GRAPNEL, or GRAPPLING, a sort of small anchor, fitted with four or five flukes or claws, and commonly used to ride a boat or other small vessel.

Fire-GRAPPLING, an instrument nearly resembling the former, but differing in the construction of its flukes, which are furnished with strong barbs on their points. These machines are usually fixed on the yard-arms of a ship, in order to grapple any adversary whom she intends to board. They are, however, more particularly used in *Fire Ships* for the purposes described in the article *Fire-Barrel*.

GRASS, in botany, is defined to be a plant having simple leaves, a stem generally jointed and tubular, a husky calyx (called *gluma*), and the seed single. Hence wheat, oats, barley, &c. are properly grasses, according to the definition given; while clover and some other similar plants are not grasses, though so frequently called by that name. Of grass, the leaves are food for cattle, the small seeds for birds, and the larger grain chiefly for man. And it is observable, that nature has so provided, that cattle, in grazing, seldom eat the flower intended to produce seed, unless compelled by hunger. For the culture of the different sorts of grain, see HUSBANDRY; and also for that of the grasses commonly so called.

Culmiferous grasses might be divided into two general classes for the purposes of the farmer, which it might be of use for him to attend to: viz. 1st, Those which, like the common annual kinds of corn, run chiefly to seed-stalks; the leaves gradually decaying as these advance towards perfection, and becoming totally withered or falling off entirely when the seeds are ripe. Rye-grass belongs to this class in the strictest sense. To it likewise may be assigned the vernal-grass, dogs'-tail-grass, and fine bent-grass. 2dly, Those whose leaves continue to advance even after the seed-stalks are formed, and retain their verdure and succulence during the whole season, as is the case with the fescue and poa tribes of grasses, whose leaves are as green and succulent when the seeds are ripe and the flower-stalks fading, as at any other time.

"It is wonderful, (says Mr. Stillingfleet) to see how long mankind has neglected to make a proper advantage of plants of

such importance, and which, in almost every country, are the chief food of cattle. The farmer, for want of distinguishing and selecting grasses for seed, fills his pastures either with weeds or bad or improper grasses; when, by making a right choice, after some trials, he might be sure of the best grass, and in the greatest abundance that his land admits of. At present, if a farmer wants to lay down his land to grass, what does he do? He either takes his seeds indiscriminately from his own foul hay-rick, or sends to his next neighbour for a supply. By this means, besides a certain mixture of all sorts of rubbish, which must necessarily happen, if he chances to have a large proportion of good seeds, it is not unlikely but that what he intends for dry land may come from moist, where it grew naturally, and the contrary. This is such a slovenly method of proceeding, as one would think could not possibly prevail universally: yet this is the case as to all grasses except the darnel-grass, and what is known in some few counties by the name of the *Suffolk grass*; and this latter instance is owing, I believe, more to the soil than any care of the husbandman. Now, would the farmer be at the pains of separating once in his life half a pint or a pint of the different kinds of grass-seeds, and take care to sow them separately, in a very little time he would have wherewithal to stock his farm properly, according to the nature of each soil, and might at the same time spread these seeds separately over the nation, by supplying the seed-shops. The number of grasses fit for the farmer is, I believe, small; perhaps half a dozen or half a score are all he need to cultivate: and how small the trouble would be of such a task, and how great the benefit, must be obvious to every one at first sight. Would not any one be looked on as wild who should sow wheat, barley, oats, rye, pease, beans, vetches, buck-wheat, turnips, and weeds of all sorts together? Yet how is it much less absurd to do what is equivalent in relation to grasses? Does it not import the farmer to have good hay and grass in plenty? and will cattle thrive equally on all sorts of food? We know the contrary. Horses will scarcely eat hay that will do well enough for oxen and cows. Sheep are particularly fond of one sort of grass, and fatten upon it faster than any other, in Sweden, if we may give credit to Linnæus. And may they not do the same in Britain? How shall we know till we have tried?"

As the generality of farmers know scarce any of the grasses by name, and as without such knowledge little improvement can be made in this branch of husbandry, we have in Plate 1. given figures of those sorts which have been recommended as the most profitable, viz.

1. *Hordeum murinum*, RYE GRASS *vulgo*. [Rye-grass *proprie* is the *SECALE villosum*. Perennial darnel, *lolium perenne*, is also, in some counties of England, improperly called *rye-grass*.] See the section on *Grasses* in the Treatise on HUSBANDRY.

2. *Festuca rubra*, PURPLE FESCUE-GRASS. See HUSBANDRY.

3. *Festuca ovina*, SHEEPS ditto. See HUSBANDRY. This is perhaps the most valuable grass of all. It is observed to grow and thrive on lands of all qualities and in all situations, from the driest upland pastures to the very moist parts of meadows. It does not part with its seeds till some time after they are ripe, and even quite dry. It makes the thickest and closest pile of any of them, and sends up but few flower-stalks in proportion to its leaves. It flowers in June, and is ripe in July.

4. *Holcus lanatus*, CREEPING SOFT-GRASS. See HUSBANDRY.

5. *Alopecurus bulbosus*, BULBOUS FOXTAIL-GRASS, is recommended by Dr. Anderson, as promising on some occasions to afford a valuable pasture-grass. It seems chiefly, he observes, to delight in a moist soil, and therefore promises to be only fit for a meadow pasture grass. The quality that first recommended it

to his notice, was the unusual firmness that its matted roots gave to the surface of the ground, naturally soft and moist, in which it grew; which seemed to promise that it might be of use upon such soils, chiefly in preventing them from being much poached by the feet of cattle which might pasture upon them. Moist soils especially are so much hurt by poaching, that any thing that promises to be of use in preventing it deserves to be attended to.

6. *Poa pratensis*, GREAT MEADOW-GRASS, seems to approach in many respects to the nature of the purple-fescue; only that its leaves are broader, and not near so long; being only about a foot or 16 inches at their greatest length. Like it, it produces few seed-stalks and many leaves, and is an abiding plant. It affects chiefly the dry parts of meadows, though it is to be found on most good pastures. It is very retentive of its seeds, and may therefore be suffered to remain till the stalks are quite dry. It blossoms the beginning of June, and its seeds are ripe in July.

7. *Poa compressa*, CREEPING MEADOW-GRASS, some writers describe to be the most valuable grass of any of this genus. Its leaves are firm and succulent, of a dark Saxon-green colour, and grow so close upon one another as to form the richest pile of pasture-grass. The flower-stalks, if suffered to grow, appear in sufficient quantities; but the growth of these does not prevent the growth of the leaves, both advancing together during the whole summer; and when the stalks fade, the leaves continue as green as before. Its leaves are much larger and more abundant than the common meadow-grass, *poa trivialis*; and therefore it better deserves to be cultivated.

8. *Anthoxanthum odoratum*, VERNAL GRASS, grows very commonly on dry hills, and likewise on sound rich meadow-land. It is one of the earliest grasses we have; and from its being found on such kinds of pasture as sheep are fond of, and from whence excellent mutton comes, it is most likely to be a good grass for sheep-pasture. It gives a grateful odour to hay. In one respect, it is very easy to gather, as it sheds its seeds upon the least rubbing. A correspondent of the Bath Society, however, mentions a difficulty that occurs in collecting them, owing to its being surrounded with taller grasses at the time of its ripening, and being almost hid among them. If it be not carefully watched when nearly ripe, he observes, and gathered within a few days after it comes to maturity, great part of the seed will be lost. The twisted elastic awns, which adhere to the seed, lift them out of their receptacles with the least motion from the wind, even while the straw and ear remain quite erect. It is found mostly in the moist parts of meadows; very little of it on dry pastures. It flowers about the beginning of May, and is ripe about the middle of June.

9. *Cynosurus cristatus*, CRESTED DOG'S-TAIL GRASS. Mr. Stillingfleet imagines this grass to be proper for parks, from his having known one, where it abounds, that is famous for excellent venison. He recommends it also, from experience, as good for sheep; the best mutton he ever tasted, next to that which comes from hills where the purple and sheeps-fescue, the fine bent, and the silver hair grasses abound, having been from sheep fed with it. He adds, that it makes a very fine turf upon dry sandy or chalky soils: but unless swept over with the scythe, its flowering-stems will look brown: which is the case of all grasses which are not fed on by variety of animals. For that some animals will eat the flowering-stems is evident by commons, where scarcely any parts of grasses appear but the radical leaves. This grass is said to be the easiest of the whole grouse to collect a quantity of seed from. It flowers in June, and is ripe in July.

10. *Stipa pennata*, COCK'S-TAIL OR FEATHER-GRASS.

11. *Agrostis capillaris*, FINE BENT, is recommended by Mr. Stillingfleet, from his having always found it in great plenty on

the best sheep pastures in the different counties of England that are remarkable for good mutton. This grass flowers and ripens its seed the latest of them all. It seems to be lost the former part of the year, but vegetates luxuriantly towards the autumn. It appears to be fond of moist ground. It retains its seed till full ripe; flowers the latter end of July, and is ripe the latter end of August.

12. *Arriza flexuosa*, MOUNTAIN HAIR.

13. *Arriza caryophyllæa*, SILVER HAIR.

The same may be said of these two grasses as of the preceding species.

14. *Festuca fluitans*, FLOTE FESCUE. In a paper published in the *Amœnitates Academicæ*, vol. 3. intitled *Plantæ Esculentæ*, we are informed, that "the seeds of this grass are gathered yearly in Poland, and from thence carried into Germany, and sometimes into Sweden, and sold under the name of *manna-seeds*. These are much used at the tables of the great, on account of their nourishing quality and agreeable taste. It is wonderful (adds the author), that amongst us these seeds have hitherto been neglected, since they are so easily collected and cleaned." There is a clamminess on the ear of the flote-fescue, when the seeds are ripe, that tastes like honey; and for this reason perhaps they are called *manna-seeds*. Linnæus (*Flor. Succ.* art. 95.) says that the bran of this grass will cure horses troubled with bots, if kept from drinking for some hours.

Concerning this grass we have the following information by Mr. Stillingfleet. "Mr. Dean, a very sensible farmer at Ruscomb, Berkshire, assured me that a field, always lying under water, of about four acres, that was occupied by his father when he was a boy, was covered with a kind of grass, that maintained five farm-horses, in good heart, from April to the end of harvest, without giving them any other kind of food, and that it yielded more than they could eat. He, at my desire, brought me some of the grass, which proved to be the flote-fescue with a mixture of the marsh-bent; whether this last contributes much towards furnishing so good pasture for horses, I cannot say. They both throw out roots at the joints of the stalks, and therefore are likely to grow to a great length. In the index of dubious plants, at the end of Ray's Synopsis, there is mention made of a grass under the name of *gramen caninum supinum longissimum*, growing not far from Salisbury, 24 feet long. This must, by its length, be a grass with a creeping stalk; and that there is a grass in Wiltshire, growing in watery meadows, so valuable, that an acre of it lets from 10 to 12 pounds, I have been informed by several persons. These circumstances incline me to think it must be the flote-fescue; but whatever grass it be, it certainly must deserve to be inquired after."

15. *Alopecurus pratensis*, MEADOW FOXTAIL. Linnæus says that this is a proper grass to sow on grounds that have been drained. Mr. Stillingfleet was informed, that the best hay which comes to London is from the meadows where this grass abounds. It is scarce in many parts of England, particularly Herefordshire, Berkshire, and Norfolk. It might be gathered at almost any time of the year from hay-ricks, as it does not shed its seeds without rubbing, which is the case of but few grasses. It is amongst the most grateful of all grasses to cattle. It is ripe about the latter end of June.

16. *Poa annua*, ANNUAL MEADOW GRASS. "This grass (says Mr. Stillingfleet) makes the finest of turfs. It grows every where by way sides, and on rich sound commons. It is called in some parts the *Suffolk grass*. I have seen whole fields of it in High Suffolk without any mixture of other grasses; and as some of the best salt-butter we have in London comes from that country, it is most likely to be the best grass for the dairy. I have seen a whole park in Suffolk covered with this grass; but whether it affords good venison, I cannot tell, having never

tasted of any from it. I should rather think not, and that the best pasture for sheep is also the best for deer. However, this wants trial. I remarked on Malvern-hill something particular in relation to this grass. A walk that was made there for the convenience of the water-drinkers, in less than a year was covered in many places with it, though I could not find one single plant of it besides in any part of the hill. This was, no doubt, owing to the frequent treading, which above all things makes this grass flourish; and therefore it is evident, that rolling must be very serviceable to it. It has been objected, that this grass is not free from *bents*, by which word is meant the flowering-stems. I answer, that this is most certainly true, and that there is no grass without them. But the flowers and stems do not grow so soon brown as those of other grasses; and, being much shorter, they do not cover the radical leaves so much; and therefore this grass affords a more agreeable turf without mowing, than any other whatever that I know of." The seeds of this species drop off before they are dry, and, to appearance, before they are ripe. The utmost care is therefore necessary in gathering the blades, without which very few of the seeds will be saved. It ripens from the middle of April to so late, it is believed, as the end of October, but mostly disappears in the middle of the summer. It grows in any soil and situation, but rather affects the shade.

17. A new grass from America, named *Agrostis cornucopiæ*, was some time ago much advertised and extolled, as possessing the most wonderful qualities, and the seeds of it were sold at the enormous rate of 68l. the bushel. But we have not heard that it has at all answered expectation. On the contrary, we are informed by Dr. Anderson, in his new publication entitled "The Bee," that "it has upon trial been found to be good for nothing. Of the seeds sown, few of them ever germinated: but enow of plants made their appearance, to ascertain, that the grass, in respect of quality, is among the poorest of the tribe; and that it is an *annual* plant, and altogether unprofitable to the farmer."

GRASS-Walks are made, for the most part, not by sowing grass-seeds, but by laying turfs: and indeed the turfs, from a fine common or down, are much preferable to sown grass: but if walks or plats are to be made by sowing, the best way is to procure the seed from those pastures where the grass is naturally fine and clear; or else the trouble of keeping it from spiry or bent grass will be very great, and it will scarce ever look handsome.

In order to sow grass-walks, the ground must be first dug; and when it has been dressed and laid even, it must be very carefully raked over, and all the clods and stones taken off, and then covered over an inch thick with good mould. This being done, the seed is to be sown pretty thick, that it may come up close and short; it must then be raked over again, to cover the seed, that, if the weather should happen to be windy, it may not be blown away. It ought also to be observed, that where grass is sown in gardens, either for lawns or walks, there should always be a good quantity of the white trefoil or Dutch clover sown with it; for this will make a fine turf much sooner than any other sown grass, and will continue a better verdure than any other of the grass-tribe.

In order to keep grass-plats or walks handsome, and in good order, you may sow in autumn fresh seed over any places that are not well filled, or where the grass is dead: but nothing improves grass so much as mowing and constant rolling. When turf is laid in gardens, it is a general practice to cover the surface of the ground under the turf, either with sand or very poor earth: the design of this is to keep the grass fine, by preventing its growing too rank. This is proper enough for very rich ground: but it is not so for such land as is middling, or but poor; for, when this is practised in such places, the grass will

soon wear out and decay in patches. When turf is taken from a common or down, such ought to be chosen as is free from weeds: and when it is designed to remain for years without renewing, a dressing should be laid upon it every other year, either of very rotten dung, ashes, or, when it can be easily procured, very rotten tan; but these dressings should be laid on early in the winter, that the rain may wash them into the ground, otherwise they will occasion the grass to burn, when the warmth of the summer begins. When grass is so dressed, and well rolled and mowed, it may be kept very beautiful for many years; but, where it is not dressed, or fed with sheep, it will rarely continue handsome more than eight or ten years.

GRASSHOPPER, in zoology, a species of gryllus. See GRYLLUS.

GRATAROLUS (William), a learned physician in the 16th century, was born at Bergamo in Italy; and taught physic with reputation at Padua: but, having embraced the Protestant religion, he retired to Switzerland, where he was made professor of physic. He died at Basil in 1568, aged 52. He wrote several curious works in Latin; amongst which are, 1. The manner of preserving and improving the memory. 2. Of preserving in health of travellers, men of letters, magistrates, and studious persons, &c.

GRATES for FIRES, are composed of ribs of iron placed at small distances from one another, so that the air may have sufficient access to the fuel, and the accumulation of the ashes, which would choke the fire, may be prevented. Grates seem peculiarly adapted to the use of pit-coal, which requires a greater quantity of air to make it burn freely than other kinds of fuel. The hearths of the Britons seem to have been fixed in the centre of their halls, as is yet practised in some parts of Scotland, where the fire is nearly in the middle of the house, and the family sit all around it. Their fire-place was perhaps nothing more than a large stone, depressed a little below the level of the ground, and thereby adapted to receive the ashes. About a century ago, it was only the floor of the room, with the addition of a bank or hob of clay. But it was now changed among the gentlemen for a portable fire-pan, raised upon low supporters, and fitted with a circular grating of bars. Such were in use among the Gauls in the first century, and among the Welch in the tenth. See the article FIRE-PLACE.

GRATIAN, the son of Valentinian I. by his first wife, was declared Augustus by his father at the city of Amiens in 365, and succeeded him in 367; a prince equally extolled for his wit, eloquence, modesty, chastity, and zeal against heretics. He associated Theodosius with him in the empire, and advanced the poet Ausonius to the consulate. He made a great slaughter of the Germans at Strasburg, and hence was surnamed *Alemannicus*. He was the first emperor who refused the title of *Pontifex Maximus*, upon the score of its being a Pagan dignity. He was assassinated by Andragathius in 375, in the 24th year of his age.

GRATIAN, a famous Benedictine monk, in the 12th century, was born at Chiufi, and employed near twenty-four years in composing a work, entitled, *Decretum*, or *Concordantia Discordantium Canonum*, because he there endeavoured to reconcile the canons which seemed contradictory to each other. This work he published in 1151. As he is frequently mistaken in taking one canon of one council, or one passage of one father for another, and has often cited false decretals, several authors have endeavoured to correct his faults; and chiefly Anthony Augustine, in his excellent work, entitled, *De emendatione Gratiani*. To the decretals of Gratian the popes principally owed the great authority they exercised in the thirteenth and following centuries.

GRATINGS, in a ship, are small edges of sawed plank, framed one into another like a lattice or prison grate, lying on

Grass vulgo.

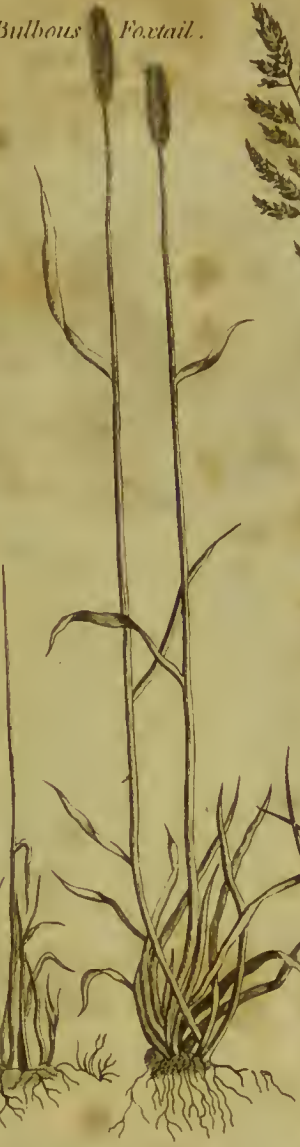
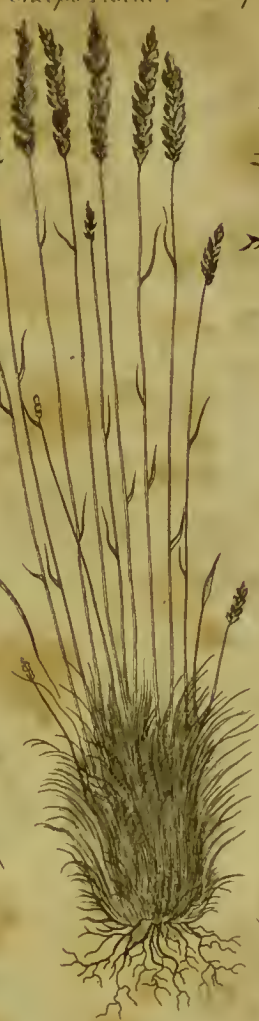
Purple Fescue.

Sheeps Fescue. Creeping Soft Grass.

Bulbous Foxtail. Great Meadow.

Creeping Meadow.

Fine Bent.



Silver

Small Grass leaved Plantain.



Crested

Dogstail.



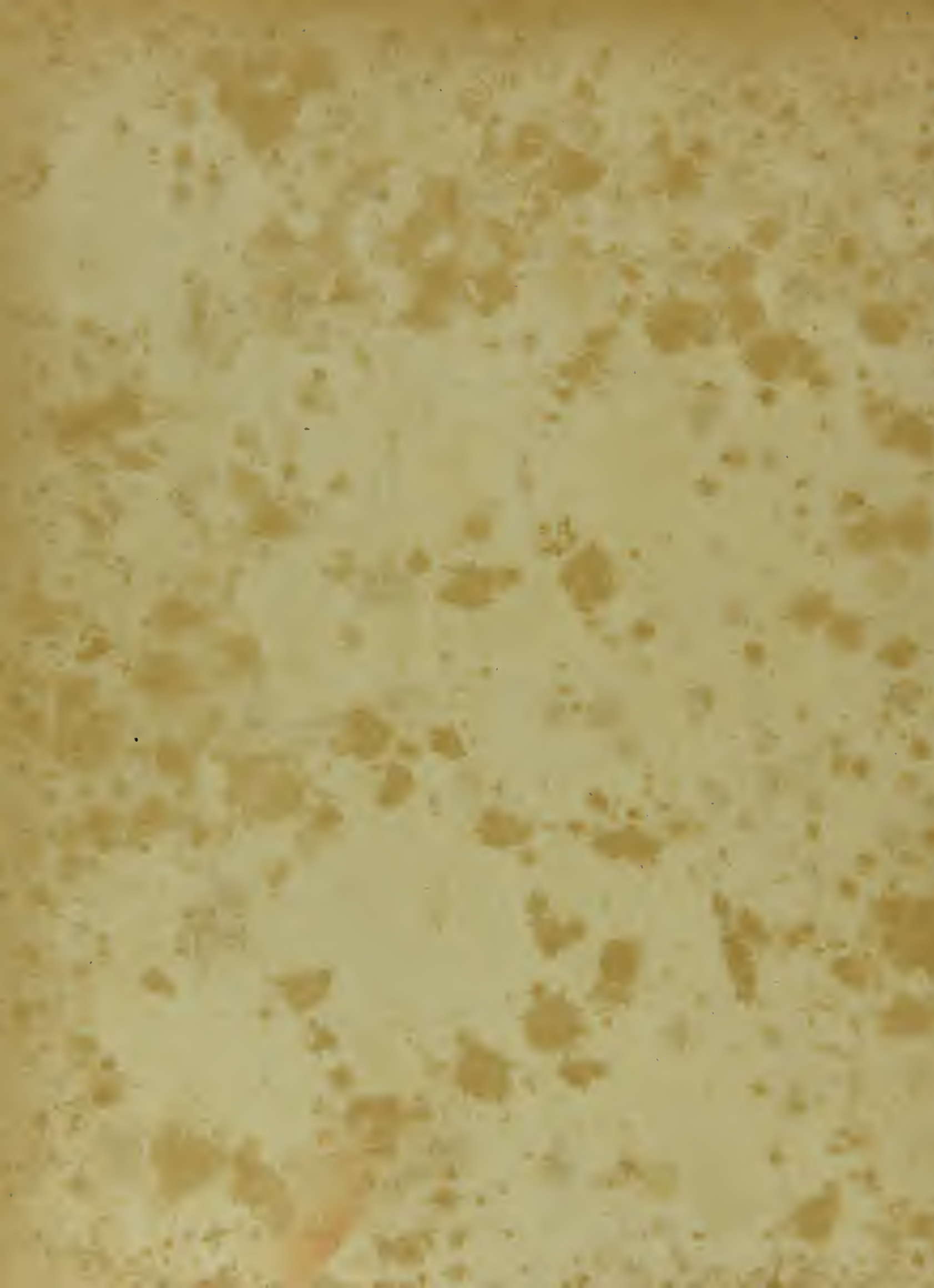
Meadow Fox-tail.

Flote Fescue.

Mountain Hair.

Annual Meadow Grass.





the upper deck, between the main-mast and fore-mast, serving for a defence in a close fight, and also for the coolness, light, and convenience of the ship's company.

GRATIOLA, HEDGE HYSSOP; a genus of the monogynia order, belonging to the diandria class of plants. The corolla is irregular; there are two barren stamens; the capsule is bilocular; the calyx has seven leaves, with the two exterior ones spatulous. There are four species; the most remarkable of which is the *officinalis*, or common hedge-hyssop. This grows naturally on the Alps and other mountainous parts of Europe. It has a thick, fleshy, fibrous, creeping root, which propagates very much, when planted in a proper soil and situation. From this arise several upright square stalks, garnished with narrow spear-shaped leaves, placed opposite. The flowers are produced on the side of the stalks at each joint; they are shaped like those of the fox glove, but are small, and of a pale yellowish colour. This herb has an emetic and purgative virtue; to answer which intentions, it was formerly used by the common people in England, but was never much prescribed by the physicians, and at last fell totally into disuse. Of late, however, it has been the subject of a dissertation by Dr. James Kofszewski of Warsaw, in Poland, who gives some remarkable accounts of its effects in mania and obstinate venereal cases. It was given in powder, or in extract, to the quantity of half a drachm of the first, and a whole drachm of the second, at each dose. From the cases related in his dissertation, the author draws the following conclusions: 1. The gratiola may be given with safety both to male and female patients. 2. In all disorders proceeding from a superabundance of serum in the fluids, it appears to be a most effectual remedy. 3. In consequence of this, it is had recourse to, with very great advantage, in melancholy and mania arising from that state of the system. 4. It powerfully promotes purging, vomiting, sweat, and urine; and is therefore much superior to any of the usual evacuating medicines, most of which prove only active in promoting one of these discharges at once. 5. The most obstinate cases of gonorrhœa, fluor albus, and venereal ulcers, are cured by the powder. In some instances it has induced salivation; but whether or not it can always be made to produce that effect, is not as yet altogether certain. 6. The powder of gratiola, prepared from the extract, and exhibited with sugar, does not induce vomiting; and, on the contrary, the powder of the root always promotes that evacuation.

GRATITUDE, in ethics, a virtue disposing the mind to an inward sense and outward acknowledgment of benefits received. Examples of ingratitude, Mr. Paley observes, check and discourage voluntary beneficence; hence the cultivation of a grateful temper is a consideration of public importance. A second reason for cultivating in ourselves that temper is: That the same principle, which is touched with the kindness of a human benefactor, is capable of being affected by the divine goodness, and of becoming, under the influence of that affection, a source of the purest and most exalted virtue. The love of God is the sublimest gratitude. It is a mistake, therefore, to imagine, that this virtue is omitted in the Scriptures; for every precept, which commands us "to love God, because he first loved us," presupposes the principle of gratitude, and directs it to its proper object. It is impossible to particularize the several expressions of gratitude, which vary with the character and situation of the benefactor, and with the opportunities of the person obliged; for this variety admits of no bounds. It may be observed, however, that on one part gratitude can never oblige a man to do what is wrong, and what by consequence he is obliged previously not to do: On the other part, it argues a total want of every generous principle, as well as of moral probity, to take advantage of that ascendancy, which the conferring of benefits justly creates, to draw or drive those whom we have obliged into mean or dishonest compliances.

There is a species of grateful remorse, which sometimes has been known to operate forcibly on the minds of the most hardened in impudence. Of this Mr. Andrews, who makes the remark, gives an instance in the following anecdote, said to have been a favourite one with the late Dr. Campbell: "Towards the beginning of this century, an actor, celebrated for mimicry, was to have been employed by a comic author, to take off the person, the manner, and the singularly awkward delivery of the celebrated Dr. Woodward, who was intended to be introduced on the stage in a laughable character (viz. in that of *Dr. Fossile*, in *Three Hours after Marriage*). The mimic dressed himself as a countryman, and waited on the doctor with a long catalogue of ailments, which he said attended on his wife. The physician heard with amazement diseases and pains of the most opposite nature, repeated and redoubled on the wretched patient. For, since the actor's greatest wish was to keep Dr. Woodward in his company as long as possible, that he might make the more observations on his gestures, he loaded his poor imaginary spouse with every infirmity which had any probable chance of prolonging the interview. At length, having become completely master of his errand, he drew from his purse a guinea, and, with a scrape, made an uncouth offer of it. 'Put up thy money, poor fellow,' cried the Doctor; 'thou hast need of all thy cash and all thy patience too, with such a bundle of diseases tied to thy back.' The actor returned to his employer, and recounted the whole conversation, with such true feeling of the physician's character, that the author screamed with approbation. His raptures were soon checked; for the mimic told him, with the emphasis of sensibility, that he would sooner die than prostitute his talents to the rendering such genuine humanity a public laughing-stock. The player's name was *Griffin*."

GRATZ, a handsome strong town of Germany, capital of Stiria, with a castle seated on a rock, and a university. Here are many handsome palaces, and a fine arsenal. The castle stands on a lofty hill, and communicates with the river by means of a very deep well. It is seated on the river Muehr, 85 miles S. W. of Vienna. E. lon. 15. 30. N. lat. 47. 4.

GRATIUS, a Latin poet, cotemporary with Ovid, and author of a poem entitled *Cynegeton*, or the *Manner of hunting with dogs*; the best edition of which is that of Leyden, 12mo, with the learned notes of Janus Ulitius.

GRAVE, in grammar, a species of accent opposite to acute. The grave accent is expressed thus (`), and shows that the voice is to be depressed, and the syllable over which it is placed pronounced in a low deep tone.

GRAVE, in music, is applied to a sound which is in a low or deep tone. The thicker the chord or string, the more grave the tone or note, and the smaller the acuter. Notes are supposed to be the more grave, in proportion as the vibrations of the chord are less quick.

GRAVE, in the Italian music, is used to denote the slowest movement.

GRAVE is also used for a tomb, wherein a person deceased is interred. Graves, among the Jews, were generally out of the city, though we meet with instances of their interring the dead in towns. Frequent mention is made of graves upon mountains, in highways, in gardens, and private houses. So that nothing on this head seems to have been determined. The same may be observed with respect to the Greeks. The Thebans had a law that every person who built an house should provide a burial-ground. Men who had distinguished themselves were frequently buried in the public forum. The most general custom was, however, to bury out of the city, chiefly by the highway side. The Romans were forbidden by the law of the 12 tables to bury or burn the dead in the city; but some we find had their sepulchres in Rome, though they paid a fine for the indulgence,

GRAVE, a strong town of Dutch Brabant, seated on the river Maete, beyond which there is a fort, eight miles S. of Nimeguen. E. lon. 5. 45. N. lat. 51. 47.

GRAVEL, in natural history and gardening, a congeries of pebbles, which, mixed with a stiff loam, makes lasting and elegant gravel-walks; an ornament peculiar to our gardens, and which gives them an advantage over those of other nations.

GRAVEL, in medicine. See MEDICINE.

GRAVEL-Walks. To make these properly, the bottom should be laid with lime-rubbish, large flint-stones, or any other hard matter, for eight or ten inches thick, to keep weeds from growing through, and over this the gravel is to be laid six or eight inches thick. This should be laid rounding up in the middle, by which means the larger stones will run off to the sides, and may be raked away; for the gravel should never be screened before it is laid on. It is a common mistake to lay these walks too round, which not only makes them uneasy to walk upon, but takes off from their apparent breadth. One inch in five feet is a sufficient proportion for the rise in the middle; so that a walk of 20 feet wide should be four inches higher at the middle than at the edges, and so in proportion. As soon as the gravel is laid, it should be raked, and the large stones thrown back again: then the whole should be rolled both lengthwise and crosswise; and the person who draws the roller should wear shoes with flat heels, that he may make no holes, because holes made in a new walk are not easily remedied. The walks should always be rolled three or four times after very hard showers, from which they will bind more firmly than otherwise they could ever be made to do.

Gravel, with some loam among it, binds more firmly than the rawer kinds; and when gravel is naturally very harsh and sharp, it is proper to add a mixture of loam to it. The best gravel for walks is such as abounds with smooth round pebbles, which, being mixed with a little loam, are bound so firmly together, that they are never afterwards injured either by wet or dry weather. These are not so liable to be turned up by the feet in walking, as the more irregularly shaped pebbles, and remain much more firmly in their places after rolling.

GRAVELINES, a strong seaport of France, in the department of the North, and late French Flanders. It was ceded to France, by the treaty of the Pyrenees, and is seated on the river Aa, 12 miles East of Calais. E. lon. 2. 13. N. lat. 50. 59.

GRAVENAC, a town of Germany, in the circle of Suabia, and capital of a county of the same name, 30 miles W. of Ulm. E. lon. 9. 28. N. lat. 48. 22.

GRAVER, in the art of engraving, a tool by which all the lines, scratches, and shades, are cut in copper, &c. See ENGRAVING.

GRAVESANDE (William James), was born of an ancient and honourable family at Delst in Holland in 1688. He studied the civil law at Leyden: but mathematical learning was his favourite amusement. When he had taken his doctor's degree in 1707, he settled at the Hague and practised at the bar, in which situation he cultivated an acquaintance among learned men; with a society of whom he published a periodical review, entitled *Le Journal Littéraire*, which was continued without interruption from the year 1713 to the year 1722, when he died. The most considerable of his works are, "A Treatise on Perspective; an Introduction to the Newtonian Philosophy, or a Treatise on the Elements of Physics confirmed by experiments; a Treatise on the Elements of Algebra, for the use of young students;" and "A Course of Logic and Metaphysics." He had intended to have presented the public with a system of morality, but his death prevented its execution. The ministers of the republic consulted him on all occasions wherein his talents were requisite; and his skill in calculation was often of service

to them; as was his address in decyphering, for detecting the secret correspondence of their enemies. As professor of mathematics and astronomy at Leyden, none ever applied the powers of nature with more success, or to more useful purposes.

GRAVESEND, a town in Kent, with a market on Wednesday and Saturday. It is seated on the Thames, and is a place of great resort, being the common landing place for seamen and strangers in their passage to London. It has a block-house over against Tilbury fort. A great part of it was burnt down, with the church, in 1727: the latter was afterwards rebuilt as one of the 50 new churches. It is commonly called the corporation of Gravesend and Milton, those two places being united under the government of a mayor, 12 aldermen, 24 common-council, a townclerk, &c. They were incorporated by queen Elizabeth; but, long before, Richard II. had granted them the exclusive privilege of conveying passengers to London in boats, at twopence a head, or a whole boat's fare at four shillings. They still enjoy this privilege; but the fare is now ninepence a head. The boats depart from Billingsgate, near London Bridge, at high water, and from Gravesend at low-water; the ringing of a bell at each place, for a quarter of an hour, giving notice of the time. Coaches attend the arrival of the boats from London, to convey the passengers to Rochester, at one shilling and sixpence each. The townhouse was erected in 1764. The chief employment of the labouring people is spinning of hemp, to make nets for fishing, and ropes. It is also famous for asparagus. It is 22 miles S. E. of London. E. lon. 0. 27. N. lat. 51. 25.

GRAVINA, a town of Italy, in the kingdom of Naples, and Terra di Bori, with a bishop's see, and the title of a duchy. E. lon. 17. N. lat. 41.

GRAVINA (John Vincent), an eminent scholar, and illustrious lawyer of Italy, born at Roggiana in 1664. He was professor of the canon law in the college of Sapienzi at Rome; and though many foreign universities made proposals to draw him to them, he never quitted that city, but died there in 1718. His works are both curious and useful; the greatest of them is *De ortu et progressu Juris Civilis*. A collection of his works was printed in 4to at Leipzig in 1737, with the notes of Mascovius.

GRAVINA (Peter), an Italian poet, much esteemed by the great general Gonsalvo, and Prosper Colonna. He wrote, in a pure Roman style, Discourses on Matters relating to the Law and to the Belles Lettres; as well as Poems. He died in 1527.

GRAVITY, or GRAVITATION (for the words are most commonly used synonymously), signifies either the force by which bodies are pressed towards the surface of the earth, or the manifest effect of that force; in which last sense the word has the same signification with *weight* or *heaviness*. Concerning gravity, in the first sense of the word, or that active power by which all bodies are impelled towards the earth, there have been great disputes. Many eminent philosophers, and among the rest Sir Isaac Newton himself, have considered it as the first of all second causes; an incorporeal or spiritual substance, which never can be perceived any other way than by its effects; an universal property of matter, &c. Others have attempted to explain the phenomena of gravitation by the action of a very subtle ethereal fluid; and to this explanation Sir Isaac, in the latter part of his life, seems not to have been averse. He hath even given a conjecture concerning a matter in which this fluid might occasion these phenomena. But for a full account of the discoveries of this great philosopher concerning the laws of gravitation, the conjectures made by him and others concerning its cause, the various objections that have been made to his doctrine, and the state of the dispute at present, see the articles *NEWTONIAN Philosophy*, *ASTRONOMY*, *ATMOSPHERE*, *EARTH*,

ELECTRICITY, FIRE, LIGHT, ATTRACTION, REPULSION, PLENUM, VACUUM, &c.

Specific GRAVITY, denotes the weight belonging to an equal bulk of every different substance. Thus, the exact weight of a cubic inch of gold, compared with a cubic inch of water, tin, lead, &c. is called its *specific gravity*. See HYDROSTATICS.

GRAUNT (John), author of a curious and celebrated book, entitled, *Natural and Political Observations made upon the Bills of Mortality*. He was a haberdasher of small wares; but laid down his trade and all public employments on account of his religion. He was educated a Puritan; afterwards professed himself a Socinian; yet, in the latter part of his life, declared himself of the Roman Catholic religion. He was a member of the Royal Society, and died in 1674.

GRAY, or GREY, a mixed colour partaking of the two extremes, black and white. In the manege they describe several sorts of grays; as the branded or blackened gray, which has spots quite black dispersed here and there. The dappled gray, which has spots of a darker colour than the rest of the body. The light or silver gray, wherein there is but a small mixture of black hairs. The sad or iron gray, which has but a small mixture of white. And the brownish or sandy-coloured gray, where there are bay-coloured hairs mixed with the black.

GRAY, a town of France, in the department of Upper Saone and late province of Franche Comté. It is a trading place, and seated on the river Saone, 25 miles N. E. of Dijon. E. lon. 5. 41. N. lat. 47. 28.

GRAY (Thomas), an admired English poet, was the youngest and only surviving son of a reputable citizen of London, and was born in Cornhill in 1716. He was educated at Eton, where he contracted a friendship with Mr. Horace Walpole, and with Mr. Richard West, son of the lord chancellor of Ireland. Mr. West and Mr. Gray were both intended for the bar; but the former died early in life, and the latter was diverted from that pursuit by an invitation to accompany Mr. Walpole in his travels; which he accepted, without any determined plan for his future life. During Mr. Gray's travels, he wrote a variety of letters to Mr. West and to his parents, which are printed with his poems; and when he returned, finding himself in narrow circumstances, yet with a mind indisposed for active employment, he retired to Cambridge, and devoted himself to study. Soon after his return, his friend West died: and the melancholy impressed on him by this event may be traced in his admired "Elegy written in a country church-yard;" which is thought to have been begun, if not finished, at this time: though the conclusion, as it stands at present, is certainly different from what it was in the first manuscript copy. The first impulse of his sorrow for the death of his friend gave birth to a very tender sonnet in English, on the Petrarchian model; and also to a sublime apostrophe in hexameters, written in the genuine strain of classical majesty, with which he intended to begin one of his books *De Principiis cogitandi*.

From the winter of the year 1742 to the day of his death, his principal residence was at Cambridge: from which he was seldom absent any considerable time, except between the years 1759 and 1762; when, on the opening of the British Museum, he took lodgings in Southampton-row, in order to have recourse to the Harleian and other manuscripts there deposited, from which he made several curious extracts, amounting in all to a tolerable sized folio, at present in the hands of Mr. Walpole.

About the year 1747, Mr. Mason, the editor of Mr. Gray's poems, was introduced to him. The former had written, a year or two before, some imitations of Milton's juvenile poems, viz. A Monody on the death of Mr. Pope, and two pieces, entitled *Il Bellicoso* and *Il Pacifico* on the peace of Aix-la-Chapelle.

pelle; and the latter revised them at the request of a friend. This laid the foundation of an intimacy, which continued without interruption to the death of Mr. Gray.

About the year 1750, Mr. Gray had put his last hand to his celebrated Elegy written in a country church-yard, and had communicated it to his friend Mr. Walpole, whose good taste was too much charmed with it to suffer him to withhold the sight of it from his acquaintance. Accordingly it was shown about for some time in manuscript, and received with all the applause it so justly merited. At last, the publisher of one of the magazines, having obtained a surreptitious copy of it, Mr. Gray wrote to Mr. Walpole, desiring that he would put his own manuscript into the hands of Mr. Doddsley, and order him to print it immediately. This was the most popular of all our author's publications. It ran through eleven editions in a very short space of time; was finely translated into Latin by Messrs. Anstey and Roberts; and in the same year by Mr. Lloyd.

From July 1759 to the year 1762, he generally resided in London, with a view, as we have already observed, of having recourse to the British Museum. In July 1768, his grace the duke of Grafton wrote him a polite letter, informing him, that his majesty had been pleased to offer to him the professorship of Modern History in the university of Cambridge, then vacant by the death of Mr. Laurence-Brocket. This place was valuable in itself, the salary being 400l. a year; but what rendered it particularly acceptable to Mr. Gray, was its being given him without any solicitation. He was indeed remarkably disinterested in all his pursuits. Though his income, before this addition, was very small, he never read or wrote with a view of making his labours useful to himself. He may be said to have been of those few personages in the annals of literature, especially in the poetical class, who are devoid of self-interest, and at the same time attentive to economy; and also was, among mankind in general, one of those very few economists, who possess that talent, untinged with the slightest stain of avarice. When his circumstances were at the lowest, he gave away such sums in private charity, as would have done credit to an ample purse. But what chiefly deterred him from seeking any advantage by his literary pursuits, was a certain degree of pride, which led him to despise the idea of being thought an author by profession.

However, it is probable, that early in life he had an intention of publishing an edition of Strabo; for his papers contain a great number of notes and geographical disquisitions on that author, particularly with respect to that part of Asia which comprehends Persia and India. The indefatigable pains which he took with the writings of Plato, and the quantity of critical as well as explanatory observations which he has left upon almost every part of his works, plainly indicate, that no man in Europe was better prepared to republish and illustrate that philosopher than Mr. Gray. Another work, on which he bestowed uncommon labour, was the Anthologia. In an interleaved copy of that collection of Greek epigrams, he has transcribed several additional ones, which he selected in his extensive reading; has inserted a great number of critical notes and emendations, and subjoined a copious index. But whether he intended this performance for the press or not, is uncertain. The only work which he meditated upon with this direct view, from the beginning, was a history of English poetry, upon a plan sketched out by Mr. Pope. He has mentioned this himself in an advertisement to those three fine imitations of Norse and Welch poetry, which he gave the world in the last edition of his poems. But, after he made some considerable preparations for the execution of this design, and Mr. Mason had offered him his assistance, he was informed that Mr. Warton, of Trinity College, Oxford, was engaged in a work of the same kind. The undertaking was there-

fore relinquished by mutual consent; and soon after, on that gentleman's desiring a sight of the plan, our author readily lent him a copy of it.

Among other sciences, Mr. Gray had acquired a great knowledge of Gothic architecture. He had seen and accurately studied in his youth, while abroad, the Roman proportions on the spot, both in ancient times and in the works of Palladio. In his later years he applied himself to consider those stupendous structures of more modern date that adorn our own country; which, if they have not the same grace, have undoubtedly equal dignity. He endeavoured to trace this ancient mode of building from the time it commenced, through its various changes, till it arrived at its perfection in the reign of Henry VIII. and ended in that of Elizabeth. For this purpose, he did not so much depend upon written accounts, as that internal evidence which the buildings themselves give of their respective antiquity; since they constantly furnish to the well-informed eye, arms, ornaments, and other marks, by which their several ages may be ascertained. On this account he applied himself to the study of heraldry as a preparatory science; and has left behind him a number of genealogical papers, more than sufficient to prove him a complete master of it. By these means he arrived at so very extraordinary a pitch of sagacity, as to be enabled to pronounce, at first sight, on the precise time when every particular part of any of our cathedrals was erected. But the favourite study of Mr. Gray, for the last ten years of his life, was natural history, which he then rather resumed than began; as, by the instructions of his uncle Antrobus, he was a considerable botanist at 15. The marginal notes which he has left on Linnæus and other writers on the vegetable, animal, and fossil kingdoms, are very numerous: but the most considerable are on Hudson's *Flora Anglica*, and the tenth edition of the *Systema Naturæ*; which latter he interleaved and filled almost entirely. While employed on zoology, he read Aristotle's treatise on that subject with great care, and explained many difficult passages of that obscure ancient by the lights he had received from modern naturalists. In a word, excepting pure mathematics, and the studies dependent on that science, there was hardly any part of human learning in which he had not acquired a competent skill, and in most of them a consummate mastery. To this account of his literary character we may add, that he had a fine taste in painting, prints, gardening, and music; and was moreover a man of good-breeding, virtue, and humanity.

He died in 1771; and an edition of his poems, with memoirs of his life and writings, was published in 4to, in 1775, by Mr. Maſon. This gentleman, however, instead of employing his own pen in drawing Mr. Gray's character, has adopted one drawn by the Rev. Mr. Temple, rector of Mamhead in Devonshire, in a letter to Mr. Boswell; to whom the public are indebted for communicating it. "Perhaps (says Mr. Temple) he was the most learned man in Europe. He was equally acquainted with the elegant and profound parts of science, and that not superficially but thoroughly. He knew every branch of history, both natural and civil; had read all the original historians of England, France, and Italy: and was a great antiquarian. Criticism, metaphysics, morals, politics, made a principal part of his plan of study; voyages and travels of all sorts were his favourite amusement; and he had a fine taste in painting, prints, architecture, and gardening. With such a fund of knowledge, his conversation must have been equally instructing and entertaining; but he was also a good man, a well-bred man, a man of virtue and humanity. There is no character without some speck, some imperfection; and I think the greatest defect in his was an affectation of delicacy, or rather effeminacy, and a visible fastidiousness, or contempt and disdain of his inferiors in science. He also had, in some degree, that

weakness which disgusted Voltaire so much in Mr. Congreve: though he seemed to value others chiefly according to the progress they had made in knowledge, yet he could not bear to be considered himself merely as a man of letters; and though without birth, or fortune, or station, his desire was to be looked upon as a private independent gentleman, who read for his amusement. Perhaps it may be said, What signifies so much knowledge, when it produces so little? Is it worth taking so much pains to leave no memorial but a few poems? But let it be considered, that Mr. Gray was, to others, at least innocently employed; to himself, certainly beneficially. His time passed agreeably; he was every day making some new acquisition in science; his mind was enlarged, his heart softened, and his virtue strengthened; the world and mankind were shown to him without a mask; and he was taught to consider every thing as trifling, and unworthy the attention of a wise man, except the pursuit of knowledge, and the practice of virtue in that state wherein God hath placed us."

GRAYLING, in ornithology, a species of SALMO. In angling for this fish, the hook must be armed upon the shanks with a very narrow plate of lead, which should be slenderest at the bend of the hook, that the bait (which is to be a large grasshopper, the uppermost wing of which must be pulled off) may come over to it the more easily. At the point let there be a cad-bait in a continual motion. The jag-tail, which is a worm of a pale flesh-colour, with a yellow tag on its tail, is an excellent bait for the grayling in March and April.

GREASE, a swelling and disease in the skin of the legs of a horse. See FARRIERY, page 438.

GREATER TONE, in music. See TONE.

GREAVES (John), an eminent physician and antiquary, was the eldest son of John Greaves, rector of Colemore, near Alresford in Hampshire, and born in 1602. He was educated at Baliol College in Oxford, from which he removed to Merton. He was afterwards, on account of his great merit, chosen geometry professor of Gresham college. His ardent thirst of knowledge soon carried him into several parts of Europe, where he eagerly seized every opportunity of improving it. His next voyage was into the eastern countries; where nothing remarkable in the heavens, earth, or even subterraneous places, seems to have escaped his nice observation. He, with indefatigable industry, and even at the peril of his life, collected a considerable number of Arabic, Persian, and Greek manuscripts, for archbishop Laud. Of these he well knew the value, as he was a master of the languages in which they were written. He also collected for that prelate many oriental gems and coins. He took a more accurate survey of the pyramids than any traveller who went before him. On his return from the East, he visited several parts of Italy a second time. During his stay at Rome, he made a particular inquiry into the true state of the ancient weights and measures. Soon after he had finished his second voyage, he was chosen Savilian professor of astronomy at Oxford. He was eminently qualified for this professorship, as the works of ancient and modern astronomers were familiar to him. His books relating to oriental learning, his *Pyramidographia*, or a description of the pyramids in Egypt, his *Epocha Celebriorum*, and other curious and useful pieces, of which Mr. Ward has given us a catalogue, show him to have been a great man. Those which he intended to publish would have shown him to be a greater; but he was stopped in his great career by death in 1652.

GREBE, in ornithology. See COLYMBUS.

GREECE, the present Rumelia, and in many respects one of the most deservedly celebrated countries in the world, was anciently bounded on the north by Macedonia and the river Strymon; on the west by the Ionian sea; on the south by the

Mediterranean; on the East by the Egean sea and Archipelago. It extended from the Strymon, by which it was parted from Thrace, to the promontory of Tenarus, the southmost point of the Peloponnesus, now the Morea, about $6^{\circ} 20'$ of latitude, or nearly 440 English miles, and in breadth from east to west about 359 miles.

The general names by which the inhabitants of this country were known to the ancients were those of *Graioi*, or *Graivoi*, from whence the name of *Greece* is plainly derived. These names are thought to come from Græcus, the father, or (according to some) the son, of Theſſalus, who gave name to Theſſaly; but some modern critics choose to derive it from *Ragau*, the same with *Reu*, the son of Peleg, by the transposition of a letter to soften the sound. These names were afterwards changed for *Achæi* and *Hellenes*; the first, as is supposed, from *Achæus*, the son of Xuthus, the son of Hellen, and father of Ion; or, according to the fable, the son of Jupiter: the other from Hellen above-mentioned, the son of Deucalion, and father of Dorus, from whom came the *Dores*, afterwards a famous nation among the Greeks. Another name by which the Greeks were known in some parts of the country was that of *Pelaſgi*, which the Arcadians, the most ancient people in Greece, deduced from their pretended founder *Pelaſgus*; who is said to have got such footing in Peloponnesus, that the whole peninsula from him was called *Pelaſgia*. But the most ancient name of all is universally allowed to have been that of *Ionæ*, which the Greeks themselves derived from Ion the son of Xuthus; or, as the fable hath it, of Apollo, by Creusa the daughter of Erichtheus the grandson of Deucalion. Josephus, however, affirms, that their original is of much older date; and that Javan, the son of Japhet, and grandson of Noah, was the first who peopled these countries; which Bochart hath also shown is very probable. It is true, indeed, that among the Greeks themselves, only the Athenians, and such colonies as sprung from them, were called *Ionæ*: but it is also plain beyond exception, that other nations gave this name to all the inhabitants of Greece.

The inhabitants of Greece in the first ages, even by the confession of their own historians, appear to have been savages scarce a degree removed from brutes. They lived indifferently on every fruit, herb, or root that came in their way; and lay either in the open fields, or at best sheltered themselves in dens, caves, and hollow trees; the country itself in the mean time remaining one continued uncultivated desert. The first improvement they made in their way of living, was the exchanging of their old food for the more wholesome acorns, building huts for themselves to sleep in, and covering their bodies with the skins of beasts. For all this, it seems they were beholden to *Pelaſgus* above mentioned (supposed by some to be Peleg spoken of in Scripture), and who was highly revered by them on that account. This reformation in their way of life, however, it seems, wrought none in their manners. On the contrary, they who had nothing to fight for but a hole to sleep in, began now to envy and rob one another of these slender acquisitions. This, in process of time, put them under a necessity of joining themselves into companies, under some head, that they might either more safely plunder their neighbours, or preserve what they had got. Laws they had none, except that of the sword: so that those only lived in safety who inhabited the most barren and craggy places; and hence Greece for a long time had no settled inhabitants, the weakest being always turned out by the strongest. Their gigantic size and strength, if we may believe Plutarch, added so much to their insolence and cruelty, that they seemed to glory in committing the greatest acts of violence and barbarity on those that unhappily fell into their hands.

The next advance towards civilization was their forming themselves into regular societies, to cultivate the lands, and build themselves towns and cities for their safety. Their origi-

nal barbarity and mutual violences against each other naturally prevented them from uniting as one nation, or even into any considerable community: and hence the great number of states into which Greece was originally divided. The most remarkable of these small principalities mentioned in history are the following: In Peloponnesus were those of Sicyon, Argos, and Mefſenia, Achaia Propria, Arcadia, and Laconia. In Grecia Propria (that part of Greece which lay without Peloponnesus), were those of Attica, Megara, Eceotia, Locris, Epichnemidia, Doris, Phoeis, Locris, Ozolæa, and Ætolia. In Epirus were the Molossi, Amphiloichi, Cassiopæi, Dræopes, Chaoces, Threſſopotii, Almeni, and Acarnani. In Theſſaly were those of Theſſaliotis, Eſtiotis, Pelaſgiotis, Magnesia, and Phthia. All these have at one time or other been severally governed by kings of their own, though we only find the names of many of them mentioned in the histories of the more considerable kingdoms of Sparta, Attica, Thebes, &c. The erection of these kingdoms, however, for some time, did not much alter the case; the inhabitants of the new kingdoms plundered and destroyed one another without mercy. Attica was the only place in any degree free from these incursions, because it was naturally destitute of every thing that could invite a plundering enemy; but those cities fared much worse which were situated on the sea-coasts; because they were in continual danger of being plundered either by the sea or land: for pirates at that time did not less infest all those seas than robbers did the land. And this was one main cause why most of the ancient cities of Greece were situated at some considerable distance from the shore; but even in these, as all their safety consisted in the resistance they could make against an invader, their inhabitants were under a necessity of going constantly armed, and being ever on their guard.

Another mischief arising from these continual piracies and robberies was, that they occasioned the far greater parts of the lands to lie uncultivated, so that the people only planted and sowed as much as was barely necessary for their present support; and where there was such an universal neglect of agriculture, there could be as little room for any discoveries in other useful arts and trades. Hence, when other nations, as the Jews, Egyptians, Midianites, Phœnicians, &c. had improved themselves to a very high degree, the Greeks seem to have been utter strangers to every useful art.

During this period of savage barbarity, the most renowned Grecian heroes, as Hercules, Theseus, &c. performed their exploits; which, however exaggerated by poetic fiction, no doubt had a foundation in truth. Some indeed are of opinion that the Grecian heroes are entirely fictitious, and their exploits derived from those of the Hebrew worthies, such as Samson, Gideon, &c. Yet, considering the extreme degree of barbarity which at that time prevailed throughout Greece, it seems not at all improbable that some persons of extraordinary strength and courage might undertake the cause of the oppressed, and travel about like the more modern knights-errant in quest of adventures.

The first expedition in which we find the Greeks united was that against Troy, some particulars of which are noticed under the article *TROY*. Their success here (which happened about 1184 B. C.) cost them very dear; vast numbers of their bravest warriors being slain; great numbers of the survivors being cast away in their return; and many of those who had the good luck to get back again being soon after murdered, or driven out of their country. It is probable, however, that their having staid for such a long time in Asia might contribute to civilize the Greeks somewhat sooner than what they otherwise would have been: and accordingly from this time, we find their history somewhat less obscure, and, as it were, beginning to emerge out of darkness. The continual wars, indeed, in which they were engaged among themselves, no doubt, for a long time, prevented them

from making any considerable advances in those arts in which they afterwards made so great a progress. These wars, which indeed never ceased as long as the Greeks preserved their liberty, rendered them brave, and skilled in the military art, above all other nations; but at the same time they effectually prevented them from making permanent conquests, and confined them within the bounds of their own country; while the different states were one way or other so equally balanced, that scarce one of them was able perfectly to subdue any other. The Spartans, however, having with great difficulty reduced the kingdom of Mælene, and added its territories to their own, became the leading people in Greece. Their superiority was long disputed by Athens; but the Peloponnesian war at last determined that point in favour of the Spartans, when the city of Athens was taken, and its walls demolished as history informs us, by Lysander the Spartan general. By the battle of Leuctra, the Spartans lost that superiority which they had maintained for 500 years, and which now devolved on the Thebans. After the death of Epaminondas, the celebrated Theban general, however, as no person was found possessed of his abilities, the Thebans were again obliged to yield the superiority to the Spartans. But by this time the Greeks had become acquainted with the luxuries and elegancies of life; and all the rigour of their original laws could not prevent them from valuing these as highly as other people. This did not indeed abate their valour, but it heightened their mutual animosities; at the same time that, for the sake of a more easy and comfortable life, they became more disposed to submit to a master. The Persians, whose power they had long dreaded, and who were unable to resist them by force of arms, at last found out (by the advice of Alcibiades) the proper method of reducing the Grecian power; namely, by assisting them by turns, and supplying one state with money to fight against another, till they should all be so much reduced, that they might become an easy prey. Thus the Greeks were weakened, though the Persians did not reap any benefit from their weakness. Philip of Macedon entered into the same political views; and partly by intrigue, partly by force, got himself declared Generalissimo of Greece. His successor Alexander the Great completed their subjection; and by destroying the city of Thebes, and exterminating its inhabitants, struck such a terror throughout Greece, that he was as fully obeyed by all the states as by any of the rest of his subjects. During his absence in Persia, however, they attempted to shake off the Macedonian yoke, but were quelled by his general Antipater. The news of Alexander's death was to them a matter of the utmost joy; but their mutual animosities prevented them from joining in any solid plan for the recovery of their liberties, and hence they continued to be oppressed by Alexander's successors, or other tyrants, till Aratus, an Achæan, about 268 B. C. formed a design of setting his country free from these oppressors. He persuaded a number of the small republics to enter into a league for their own defence, which was called the *Achæan league*; and notwithstanding that the republics, taken singly, had very little strength, they not only maintained their independency, but soon became formidable when united. This association continued to become daily more and more powerful; but received a severe check from Cleomenes, king of Sparta, which obliged them to call in Antigonus to their assistance. This prince overcame Cleomenes at the battle of Sellasia, and afterwards made himself master of Sparta. Thus he became a more formidable enemy than the one he had conquered, and the recovery of the Grecian liberties was incomplete.

Soon after this, the Greeks began to feel the weight of a power more formidable than any which they had yet experienced, namely, that of the Romans. That insidious and haughty republic first intermeddled with the Grecian affairs, under pretence of setting them at liberty from the oppression of

Philip of Macedon. This, by a proper union among themselves, they might have accomplished; but in this they acted as though they had been insatuated; receiving with the utmost joy the decree of the Roman consul, who declared them free; without considering, that he who had thus given them liberty might take it away at his pleasure. This lesson, however, they were soon taught, by the total reduction of their country to a Roman province; yet this can scarce be called a misfortune, when we look back to their history, and consider their outrages upon one another: nor can we sympathise with them for the loss of that liberty which they only made use of to fill their country with slaughter and bloodshed. After their conquest by the Romans, they made no united effort to recover their liberty. They continued in quiet subjection till the beginning of the 15th century. About that time, they began to suffer under the tyranny of the Turks, and their sufferings were completed by the taking of Constantinople in 1453. Since that time, they have groaned under the yoke of a most despotic government; so that all traces of their former valour, ingenuity, and learning, are now in a manner totally extinct.

Modern Greece comprehends Macedonia; Albania, now called *Arnaut*; Epirus; Thessaly, now *Jana*; Achaia, now *Livadia*; the Peloponnesus, now *Morea*; together with the islands on its coast, and in the Archipelago. The continent of Greece is seated betwixt the 36th and 43d degrees of north latitude; and between the 19th and 27th degrees of longitude, east of London. To the north it is bounded by Bulgaria and Servia, from which it is divided by a ridge of mountains; to the south by the Mediterranean sea; to the east by Romania and the Archipelago, and to the west by the Adriatic, or gulph of Venice. Its length is said to be about 400 miles, and its utmost breadth about 350 miles. The air is extremely temperate and healthy; and the soil fruitful, though badly cultivated, yielding corn, wine, delicious fruits, and abounding with cattle, fowls, and venison. As to religion, Christianity was planted in Greece soon after the death of our Saviour, and flourished there for many ages in great purity; but since the Greeks became subject to the Turkish yoke, they have sunk into the most deplorable ignorance, in consequence of the slavery and thralldom under which they groan, and their religion is now greatly corrupted. It is indeed little better than a heap of ridiculous ceremonies and absurdities. The head of the Greek church is the patriarch of Constantinople; who is chosen by the neighbouring archbishops and metropolitans, and confirmed by the emperor or grand visir. He is a person of great dignity, being the head and director of the eastern church. The other patriarchs are those of Jerusalem, Antioch, and Alexandria. Mr. Tournefort tells us, that the patriarchates are now generally set to sale, and bestowed upon those who are the highest bidders. The patriarchs, metropolitans, archbishops, bishops, are always chosen from among the Caloyers or Greek monks. Before the patriarchs receive their patents and the castan, which is a vest of linsley-woolsey, or some other stuff, presented by the grand signior to ambassadors and other persons newly invested with some considerable dignity, they are obliged to make large presents to the visir, &c. The income of the patriarch of Constantinople is said to amount to no less than one hundred and twenty thousand guilders, of which he pays the one-half, by way of annual tribute, to the Ottoman Porte, adding six thousand guilders besides as a present at the feast of Bairam. The next person to a bishop among the clergy is an archimandrite, who is the director of one or more convents, which are called *mandren*; then come the abbot, the arch-priest, the priest, the deacon, the under-deacon, the chanter, and the lecturer. The secular clergy are subjected to no rules, and never rise higher than high-priest. They are allowed to marry once; but it must be with a virgin, and before they are ordained,

They have neither glebe nor tythes, but depend on the perquisites that arise from their office; and they seldom preach but in Lent. The Greeks have few nunneries; but a great many convents of monks, who are all priests, and, students excepted, obliged to follow some handicraft employment, and lead a very austere life. The Greeks deny the supremacy of the pope, and abhor the worship of images; but have a multitude of pictures of saints in their churches, whom they pray to as mediators. Their fasts are very severe. They believe also in the doctrine of transubstantiation, and that the Holy Ghost does not proceed from the Son. They admit not of purgatory, says Mr. Thevenot: but yet they allow a third place, where they say the blessed remain, in expectation of the day of judgment. At mass they consecrate with leavened bread; and communicate under both kinds, as well laics as priests, and as well women and children as men. When they carry the sacrament to the sick, they do not prostrate themselves before it, nor expose it to be adored: neither do they carry it in procession, or have any particular feast in honour of it. Baptism is performed among them by plunging the whole body of the child thrice into water. Immediately after baptism, they give it confirmation and the communion; and seven days after that, it undergoes the ceremony of ablution. When a priest is married, among other ceremonies, the bridegroom and bride drink each two glasses of wine; then the glass is given to the priest, who merrily drinks off the rest of the wine, and, breaking the glass, says, So may the bridegroom break the virginity of the bride. As to the character of the modern Greeks, they are said to be very covetous, hypocritical, treacherous, great pederasts, and at the same time revengeful to the highest degree, but very superstitious. They are so much despised by the Turks, that these do not value even a Greek who turns Mahometan. The Turks are remarkable for their taciturnity; they never use any unnecessary words; but the Greeks, on the contrary, are very talkative and lively. The Turks generally practise what their religion enjoins, but the Greeks do not; and their misery puts them upon a thousand mean shifts and scandalous practices, authorized by bad example, and perpetuated from father to son. The Greek women have fine features and beautiful complexions: their countenances still very much resemble those of the ancient Greek statues.

GREEK, or GRECIAN, any thing belonging to ancient Greece. The Greek language, as preserved in the writings of the celebrated authors of antiquity, as Homer, Hesiod, Demosthenes, Aristotle, Plato, Xenophon, &c. has a great variety of terms and expressions, suitable to the genius and occasions of a polite and learned people, who had a taste for arts and sciences. In it, proper names are significative; which is the reason that the modern languages borrow so many terms from it. When any new invention, instrument, machine, or the like, is discovered, recourse is generally had to the Greek for a name to it; the facility wherewith words are there compounded, affording such as will be expressive of its use: such are, barometer, hygrometer, microscope, telescope, thermometer, &c. But of all sciences, medicine most abounds with such terms; as diaphoretic, diagnosis, diarrhoea, hæmorrhage, hydrophobia, phthisis, atrophy, &c. Besides the copiousness and significance of the Greek, wherein it excels most, if not all, the other languages, it has also three numbers, viz. a singular, dual, and plural: also abundance of tenses in its verbs, which makes a variety in discourse, prevents a certain dryness that always accompanies too great an uniformity, and renders that language peculiarly proper for all kinds of verse. The use of the participles, of the aorist and preterite, together with the compounds words already mentioned, give it a peculiar force and brevity, without taking any thing from its perspicuity.

It is no easy matter to assign the precise difference between

the modern and ancient Greek; which consists in the terminations of the nouns, pronouns, verbs, &c. not unlike what obtains between some of the dialects of the Italian or Spanish. There are also in the modern Greek many new words, not to be met with in the ancient. We may therefore distinguish three ages of the Greek tongue: the first of these ends at the time when Constantinople became the capital of the Roman empire; the second lasted from that period to the taking of Constantinople by the Turks; and the third from that time to the present.

GREEK Bible. See BIBLE.

GREEK Church, is that part of the Christian church which is established in Greece; extending likewise to some other parts of Turkey. See GREECE. It is thus called in Europe, Asia, and Africa, in contradistinction from the Latin or Romish church; as also the Eastern church, in distinction from the Western. The Romanists call the Greek church, the *Greek schism*; because the Greeks do not allow the authority of the pope, but depend wholly, as to matters of religion, on their own patriarchs. They have treated them as schismatics ever since the revolt, as they call it, of the patriarch Photius.

GREEK Monks and Nuns, of whatever order, consider St. Basil as their founder and common father, and esteem it the highest crime to deviate in the least from his constitutions. There are several beautiful convents with churches, in which the monks perform divine service day and night. Some of the monks are cœnobites, or live together, wear the same habit, eat at the same table, and perform the same exercises and employments.

GREEK Orders, in architecture, are the Doric, Ionic, and Corinthian; in contradistinction to the two Latin orders, the Tuscan and Composite. See ORDER.

GREEN, one of the original prismatic colours, exhibited by the refraction of the rays of light. See CHROMATICS and COLOUR.

GREEN, among painters and dyers. See COLOUR-Making, and the article DYEING, page 136.

GREEN-Finch, in ornithology, the English name of the greenish fringilla, with the wings and tail variegated with yellow. See FRINGILLA.

GREEN-House, or Conservatory, a house in a garden, contrived for sheltering and preserving the most curious and tender exotic plants, which in our climate will not bear to be exposed to the open air, especially during the winter season. These are generally large and beautiful structures, equally ornamental and useful.

The length of greenhouses must be proportioned to the number of plants intended to be preserved in them, and cannot therefore be reduced to rule; but their depth should never be greater than their height in the clear; which, in small or middling houses, may be 16 or 18 feet, but in large ones from 20 to 24 feet; and the length of the windows should reach from about one foot and a half above the pavement, and within the same distance of the ceiling, which will admit of a cornice round the building over the heads of the windows. Their breadth cannot be in proportion to their length; for, if in the largest buildings they are more than seven or seven feet and a half broad, they will be extremely heavy and inconvenient. The piers between the windows must be as narrow as may be to support the buildings; for which reason they should either be of stone or of hard burnt bricks. If the piers are made of stone, they should be 30 inches wide in front, and sloped off behind to about 18 inches, by which means there will be no corners to take off the rays of the sun. If they are of brick, they will require to be at least three feet in front, but they should be in the same manner sloped off behind. Over the greenhouse may be rooms for dry-

ing and preserving seeds, roots, &c. and behind it a place for tools and other purposes; and both these behind, and the rooms above, will be of great use in keeping off the frosts, so that the wall between these need not be of more than two bricks and a half in thickness.

The floor of the greenhouse, which should be laid either with Bremen squares, Purbeck stone, or flat tiles, must be raised two feet above the surface of the adjoining ground, or, if the situation be damp, at least three feet; and if the whole is arched with low brick arches under the floor, they will be of great service in preventing damp; and under the floor, about two feet from the front, it will be very advisable to make a flue of ten inches wide and two feet deep; this should be carried the whole length of the house, and then returned back along the hinder part, and there be carried up into funnels adjoining to the tool-house, by which the smoke may be carried off. The fire-place may be contrived at one end of the house, and the door at which the fuel is put in, as also the ash-grate, may be contrived to open into the tool-house, and the fuel being laid in the same place, the whole will be out of sight. Bradley advises, that the front of greenhouses in the colder parts of England be built in a sweep or semicircle, so that one part or other of it may receive the sun's rays all day. The use of fires must, however, be very sparing in this place; and it is not one winter in three or four that will require them in any part, only when the weather is very severe, and the frost cannot well be kept out any other way; this is an expedient that is good to have in readiness, as it may save a whole house of plants. Within side of the windows, in front of the greenhouse, there should be good strong shutters, made with hinges, to fold back close to the piers, that they may not obstruct the rays of the sun. The back part of the house should be either laid over with stucco, or plastered with mortar, and whitewashed, in order to prevent the frosty air from penetrating through the walls. When the greenhouse is wainscoted, the walls should be plastered with lime and hair behind the wainscot, to keep out the cold; and the wainscot, as well as the cieling, and every part within the house, should be painted white, for the reflection of the sun's rays. There must be a number of tressels, with forms of wood upon them, to support the pots of plants; the tallest to be placed hindmost, the lowest within four feet of the windows: and the rows of plants should rise gradually, so that the heads of the second row should be entirely above the first; and behind them there should be a space of at least five feet, for the convenience of watering the plants, and for a free circulation of air. It has been observed, that the placing of the euphorbiums, cereuses, and other succulent plants among orange-trees, and other common greenhouse-plants, is always destructive of them, by making them receive an improper sort of effluvia, which plants of that kind imbibe very freely. They should therefore be placed in two wings built at each end of the greenhouse; which, if well contrived, will be a great beauty as well as use to the building. These wings may be made capable of a greater warmth also by more flues, and may be made to contain a hot-bed of tanners' bark for the raising many of the tender plants that are natives of warm climates.

Whilst the front of the greenhouse is exactly south, one of the wings may be made to face the south-east and the other the south-west. By this disposition the heat of the sun is reflected from one part of the building to the other all day, and the front of the main greenhouse is guarded from the cold winds. These two wings may be so contrived as to maintain plants of different degrees of hardness, which may be easily effected by the situation and extent of the fire-place, and the manner of conducting the flues: the wing facing the south-east is evidently the most proper for the warmest stove; this may be divided in the middle by a partition of glass, with glass-doors opening from one

division to the other. In each of these there should be a fire-place, with flues carried up against the back-wall, through which the smoke should be made to pass as many times the length of the house as the height will admit of the number of flues; for the longer the smoke is in passing, the more heat will be given to the house with a less quantity of fuel. The other wing, facing the south-west, should be divided and furnished with flues in the same manner; and thus different degrees of heat may be obtained, according to the seasons and the particular sorts of plants that are to be preserved. If there are no sheds behind these wings, the walls should not be less than three bricks thick; and the back part, having sloping roofs, which are covered with tiles or slates, should be lined with reeds, &c. under the covering. The sloping glasses of these houses should be made to slide and take off, so that they may be drawn down more or less in warm weather to admit air to the plants; and the upright glasses in the front may be so contrived, as that every other may open as doors upon hinges, and the alternate glasses may be divided into two: the upper part of each should be so contrived as to be drawn down like shades, so that either of them may be used to admit air in a greater or less quantity as there may be occasion.

As to the management of plants in a greenhouse, Mortimer recommends the opening of the mould about them from time to time, and sprinkling a little fresh mould in them, and a little warm dung on that: as also to water them when the leaves begin to wither and curl, and not oftener, which would make them fade and be sickly; and to take off such leaves as wither and grow dry.

GREEN-Sickness, Chlorosis. See MEDICINE.

GREEN-Silver, the name of an ancient custom within the manor of Writtel in the county of Essex in England; which is, that every tenant, whose fore-door opens to Greenbury, shall pay an halfpenny yearly to the lord, by the name of *green-silver*.

GREEN-Wax, is used where estates are delivered to the sheriffs out of the exchequer, under the seal of that court, made in green-wax, to be levied in the several counties. This word is mentioned in 43d stat. Ed. III. c. 9. and 7 Hen. IV. c. 4.

GREENLAND, a general name by which are denoted the most easterly parts of America, stretching towards the N. Pole, and likewise some islands to the N. of the continent of Europe, lying in very high latitudes. This country is divided into W. and E. Greenland. West Greenland is now determined by our latest maps to be a part of the continent of America, though on what authority is not very clear. That part of it of which the Europeans have any knowledge, is bounded on the W. by Baffin's Bay, on the S. by Davis' Straits, and on the E. by the northern part of the Atlantic Ocean. East Greenland was for a long time considered as a part of the continent of W. Greenland, but is now discovered to be an assemblage of islands lying between 9° and 20° E. lon. and 76. 46. and 80. 30. N. lat. It was discovered in 1533 by sir Hugh Willoughby, who called it Greenland, supposing it to be part of the western continent. In 1595 it was visited by William Barentz and John Cornelius, two Dutchmen, who pretended to be the original discoverers, and called the country Spitzbergen, or sharp mountains, from the many sharp-pointed and rocky mountains with which the country abounds. The few inhabitants of Greenland are savages, and much like the Esquimaux. It is a cold miserable country, and has very few animals, except deer, white bears, foxes, and a few wild fowls. Here the English, Dutch, and other nations, go every year to catch whales, for the sake of their fins and oil. It was so called, because those that discovered it at first found the shore covered with green moss. Attempts have been made to settle in it; but the men generally perished with the severity of the cold.

GREENLAND Company. A joint stock of 40,000l. was by statute to be raised by subscribers, who were incorporated for 14 years from the first of October 1693, and the company to use the trade of catching whales, &c. into and from Greenland, and the Greenland seas. They may make bye-laws for the government of the persons employed in their ships, &c. Stat. 4 and 5 W. III. cap. 17. This company was farther encouraged by parliament in 1696; but partly by unskilful management, and partly by real losses, it was under the necessity of entirely breaking up, before the expiration of the term assigned to it, ending in 1707. But any person who will adventure to Greenland for whale-fishing shall have all the privileges granted to the Greenland company by 1 Anne, cap. 16. and thus the trade was again laid open. Any subjects may import whale-fins, oil, &c. of fish caught in the Greenland seas, without paying any customs, &c. Stat. 10 Geo. I. cap. 16. And ships employed in the Greenland fishery are to be of a given burden, provided with boats, so many men, fishing-lines, harping-irons, &c. and be licensed to proceed; and on their return shall be paid 20s. per ton bounty for whale-fins, &c. imported. 6 Geo. II. cap. 33. The bounty was afterwards increased, but has been lately diminished, and since this diminution the trade has increased. See *BALÆNA* and *Whale-FISHERY*.

GREENOCK, a considerable seaport of Scotland, in the county of Renfrew, at the mouth of the Clyde. It is a place of great resort for shipping; but its trade chiefly depends on Glasgow. It has a great share in the herring-fishery; and the town has much increased within the last 30 years. Here is a sugar-house, and a rope and sail manufactory. At the W. end of the town is a small fort for the defence of the harbour. It is 22 miles W. of Glasgow. W. lon. 4. 29. N. lat. 55. 54.

GREENWICH, a town in Kent, five miles E. of London, noted for its magnificent hospital for decayed seamen, its delightful park, and its astronomical observatory, on the summit of a hill, called Flamsteed Hill, from the great astronomer of that name, who was here the first astronomer-royal. The English compute the longitude from the meridian of this place. The hospital is thought to be the finest structure of the kind in the world; and its noble hall is finely painted by Sir James Thornhill. The chapel was destroyed, Jan. 2, 1779, by a dreadful fire, which likewise consumed the dining-hall and eight wards. But the whole is rebuilt; and the chapel was opened for divine service on the 20th of September 1789. The rebuilding of this beautiful structure, which is decorated in a style of the most elegant simplicity, cost 84,000l. Here was once a royal palace, in which queen Mary and queen Elizabeth were born, and in which Edward VI. died. It has been long pulled down, and on part of the site of it now stands the house belonging to the ranger of the park; and which, from the Thames, appears in the centre, beyond the two extremities of the hospital. The church, one of the 50 new churches, is dedicated to St. Alphage. In this town is a college, called the Duke of Norfolk's College, although founded by Henry earl of Northampton, father of the celebrated earl of Surry. It is for the maintenance of 20 decayed housekeepers; 12 from Greenwich, and eight chosen alternately from Snettisham and Castle Rising in Norfolk. Here is also an hospital, called Queen Elizabeth's College, founded by Mr. Lambard, author of the *Pereambulation* of Kent, the first erected by any English Protestant subject.

GREGARIOUS, among zoologists, a term applied to such animals as do not live solitary, but associate in herds or flocks.

GREGORIAN CALENDAR, that which shews the new and full moon, with the time of Easter, and the moveable feasts de-

pending thereon, by means of epacts disposed through the several months of the Gregorian year. See *CHRONOLOGY*, page 523.

GREGORIAN Telescope. See *OPTICS*.

GREGORIAN Year. See *CHRONOLOGY*, page 523.

GREGORY the Great, was born at Rome, of a patrician family. He discovered such abilities in the exercise of the senatorial employments, that the emperor Justin the younger appointed him prefect of Rome. Pope Pelasgius II. sent him nuncio to Constantinople, to demand succours against the Lombards. When he thought of enjoying a solitary life, he was elected pope by the clergy, the senate, and the people of Rome. Besides his learning and diligence in instructing the church, both by writing and preaching, he had a very happy talent in winning over princes in favour of the temporal as well as spiritual interests of religion. He undertook the conversion of the English, and sent over some monks of his order, under the direction of Augustin their abbot. His morality with respect to the chastity of churchmen was very rigid, asserting, that a man who had ever known a woman ought not to be admitted to the priesthood; and he always caused the candidates for it to be examined upon that point. He likewise vigorously exerted himself against such as were found guilty of calumny. However, he flattered the emperor Phocas, while his hands were yet reeking with the blood of Mauritius, and of his three children, who had been butchered in his sight. He likewise flattered Brunehaut, a very wicked queen of France. He is accused of destroying the noble monuments of ancient Roman magnificence, that those who visited the city might not attend more to the triumphal arches than to holy things; and burnt a multitude of heathen books, those of Livy in particular. He died in 604.

GREGORY of Nazianzen, surnamed the *Divine*, was one of the most illustrious ornaments of the Greek church in the fourth age. He was made bishop of Constantinople in 379; but finding his election contested by Timotheus archbishop of Alexandria, he voluntarily resigned his dignity about 382, in the general council of Constantinople. His works are extant, in two volumes, printed at Paris in 1609. His style is said to be equal to that of the most celebrated orators of ancient Greece.

GREGORY (Theodorus), surnamed *Thaumaturgus*, on account of his miracles, was the scholar of Origen; and was elected bishop of Neocæsarea, the place of his birth, about the year 240, during his absence. He assisted at the council of Antioch in 255, against Paulus Samosetanus, and died in 270. He had the satisfaction of leaving only seventeen idolaters in his diocese, where there were but seventeen Christians when he was ordained. There is still extant of his, A gratulatory oration to Origen, A canonical epistle, and some other works.

GREGORY, bishop of Nyssa, one of the fathers of the church, and author of the Nicene creed, was born in Cappadocia about the year 331. He was chosen bishop of Nyssa in 372; and banished by the emperor Valens for adhering to the council of Nice. He was nevertheless afterwards employed by the bishops in several important affairs, and died in 396. He wrote Commentaries on the Scriptures; Sermons on the mysteries; Moral discourses; Dogmatical treatises; Panegyrics on the saints; some letters on church discipline; and other works. His style is very allegorical and affected.

GREGORY of Tours, or *Georgius Florentinus Gregorius*, one of the most illustrious bishops and celebrated writers of the sixth century, was descended from a noble family in Auvergne. He was educated by his uncle Gallus, bishop of Clermont, and distinguished himself so much by his learning and virtue, that in

573 he was chosen bishop of Tours. He afterwards went to Rome to visit the tomb of the apostles, where he contracted a friendship with Gregory the Great, and died in 595. This author was extremely credulous with regard to miracles. He wrote, 1. The history of France. 2. The lives of the saints; and other works. The best edition is that published by Father Rumart, in 1699.

GREGORY (James), one of the most eminent mathematicians of the last century, was a son of the Rev. Mr. John Gregory, minister of Drumoak in the county of Aberdeen, and was born at Aberdeen in 1638. His mother was a daughter of Mr. David Anderson of Finzaugh, a gentleman who possessed a singular turn for mathematical and mechanical knowledge. This mathematical genius was hereditary in the family of the Andersons, and from them seems to have been transmitted to their descendants of the name of Gregory. Alexander Anderson, cousin-german of the above-mentioned David, was professor of mathematics at Paris in the beginning of the 17th century, and published there, in 1612, *Supplementum Apollonii redivivi*, &c. The mother of James Gregory inherited the genius of her family; and observing in her son, while yet a child, a strong propensity to mathematics, she instructed him herself in the elements of that science. He received his education in the languages at the grammar school of Aberdeen, and went through the usual course of academical studies in the Marischal college.

At the age of 24 he published his treatise, intitled *Optica Promota, seu abilita radiorum reflexorum et refractorum mysteria, geometricæ enucleata; cui subnectitur appendix subtilissimorum astronomiæ problematum resolutionem exhibens*, London 1663: a work of great genius, in which he gave the world an invention of his own, and one of the most valuable of the modern discoveries, the construction of the reflecting telescope. This discovery immediately attracted the attention of the mathematicians, both of our own and foreign countries, who were soon convinced of its great importance to the sciences of optics and astronomy. The manner of placing the two specula upon the same axis appearing to Sir Isaac Newton to be attended with the disadvantage of losing the central rays of the larger speculum, he proposed an improvement on the instrument, by giving an oblique position to the smaller speculum, and placing the eye-glass in the side of the tube. But it is worth remarking, that the Newtonian construction of that instrument was long abandoned for the original or Gregorian, which is at this day universally employed where the instrument is of a moderate size; though Mr. Herschel has preferred the Newtonian form for the construction of those immense telescopes, which of late years he has so successfully employed in examining the heavens.

The university of Padua being at that time in high reputation for mathematical studies, James Gregory went thither soon after the publication of his first work; and fixing his residence there for some years, he published in 1667, *Vera Circuli et Hyperbolæ quadratura*; in which he propounded another discovery of his own, the invention of an infinitely converging series for the areas of the circle and hyperbole. To this treatise, when published in 1668, he added a new work, intitled, *Geometriæ pars universalis, inserviens quantitatum curvarum transmutationi et mensuræ*; in which he is allowed to have shown, for the first time, a method for the transmutation of curves. These works engaged the notice, and procured Mr. Gregory the correspondence, of the greatest mathematicians of the age, Newton, Huygens, Halley, and Wallis; and their author being soon after chosen a fellow of the royal society of London, contributed to enrich the Philosophical Transactions at that time by many excellent papers. Through this channel, in particular, he carried on a dispute with Mr. Huygens, upon the occasion of his

treatise on the quadrature of the circle and hyperbole, to which that able mathematician had started some objections. Of this controversy, it is unnecessary to enter into particulars. It is sufficient to say, that, in the opinion of Leibnitz, who allows Mr. Gregory the highest merit for his genius and discoveries, Mr. Huygens has pointed out, though not errors, some considerable deficiencies in the treatise above mentioned, and shown a much simpler method of attaining the end in view.

In 1668 Mr. James Gregory published at London another work, intitled *Exercitationes Geometricæ*, which contributed still to extend his reputation. About this time he was elected professor of mathematics in the university of St. Andrew's; an office which he held for six years. During his residence there, he married in 1669 Mary, the daughter of George Jameſon the celebrated painter, whom Mr. Walpole has termed the Vandyke of Scotland, and who was fellow-disciple with that great artist in the school of Rubens at Antwerp.

In 1674 he was called to Edinburgh, to fill the chair of mathematics in that university. This place he had held for little more than a year, when, in October 1675, being employed in showing the satellites of Jupiter through a telescope to some of his pupils, he was suddenly struck with total blindness, and died a few days after, at the early age of 37.

He was a man of an acute and penetrating genius. His temper seems to have been warm, as appears from the conduct of his dispute with Mr. Huygens; and, conscious perhaps of his own merits as a discoverer, he seems to have been jealous of losing any portion of his reputation by the improvements of others upon his inventions.

GREGORY (David), Savilian professor of astronomy at Oxford, whom Dr. Smith has termed *subtilissimi ingenii mathematicus*, was the eldest son of Mr. Gregory of Kinnairdy, brother of the abovementioned Mr. James Gregory. He was born at Aberdeen in 1661, and received the earlier parts of his education in that city. He completed his studies at Edinburgh; and, being possessed of the mathematical papers of his uncle, soon distinguished himself likewise as the heir of his genius. In the 23d year of his age, he was elected professor of mathematics in the university of Edinburgh; and published, in the same year, *Exercitatio Geometrica de dimensione figurarum, sive specimen methodi generalis dimetiendi quasvis figuras*, Edinburgh, 1684, 4to. He saw very early the excellence of the Newtonian philosophy; and had the merit of being the first who introduced it into the schools by his public lectures at Edinburgh. "He had (says Mr. Whiston) already caused several of his scholars to keep acts, as we call them, upon several branches of the Newtonian philosophy; while we at Cambridge, poor wretches, were ignominiously studying the fictitious hypotheses of the Cartesian."

In 1691, on the report of Dr. Bernard's intention of resigning the Savilian professorship of astronomy at Oxford, David Gregory went to London; and being patronised by Sir Isaac Newton, and warmly befriended by Mr. Flamsteed the astronomer royal, he obtained the vacant professorship, for which Dr. Halley was a competitor. This rivalry, however, instead of animosity, laid the foundation of friendship between these eminent men; and Halley soon after became the colleague of Gregory, by obtaining the professorship of geometry in the same university. Soon after his arrival in London, Mr. Gregory had been elected a fellow of the royal society; and, previously to his election into the Savilian professorship, had the degree of doctor of physic conferred on him by the university of Oxford.

In 1693 he published in the Philosophical Transactions a re-

solution of the Florentine problem *de Testuline veliformi quadribili*; and he continued to communicate to the public, from time to time, many ingenious mathematical papers by the same channel. In 1695 he printed at Oxford *Catoptrica et Dioptrica Sphæricæ Elementa*; a work which, as he informs us in his preface, contains the substance of some of his public lectures read, eleven years before, at Edinburgh. This valuable treatise was republished first with additions by Dr. William Brown, with the recommendation of Mr. Jones and Dr. Desaguliers; and afterwards by the latter of these gentlemen, with an appendix containing an account of the Gregorian and Newtonian telescopes, together with Mr. Hadley's tables for the construction of both those instruments. It is not unworthy of remark, that, in the end of this treatise, there is an observation which shows, that what is generally believed to be a discovery of a much later date, the construction of achromatic telescopes, which has been carried to great perfection by Mr. Dollond and Mr. Ramsden, had suggested itself to the mind of David Gregory, from the reflection on the admirable contrivance of nature in combining the different humours of the eye. The passage is as follows: "Quod si ob difficultates physicas in speculis idoneis torno elaborandis et poliendis, etiamnum lentibus uti oporteat, fortassis media diversæ densitatis ad lentem objectivam componendam adhibere utile foret, ut a natura factum observamus in oculi fabrica, ubi cristallinus humor (fere ejusdem cum vitro virtutis ad radios lucis refringendos) aqueo et vitreo (aquæ quoad refractionem haud abssimilibus) conjungitur, ad imaginem quam distincte fieri poterit, a natura nihil frustra moliente, in oculi fundo depingendam." *Catopt. et Dioptr. Sphær. Elem. Oxon.* 1695, p. 98.

In 1702 our author published at Oxford, *Astronomiæ Physicæ et Geometricæ Elementa*; a work which is accounted his masterpiece. It is founded on the Newtonian doctrines, and was esteemed by Sir Isaac Newton himself as a most excellent explanation and defence of his philosophy. In the following year he gave to the world an edition in folio of the works of Euclid in Greek and Latin; in prosecution of a design of his predecessor Dr. Bernard, of printing the works of all the ancient mathematicians. In this work, although it contains all the treatises attributed to Euclid, Dr. Gregory has been careful to point out such as he found reason, from internal evidence, to believe to be the productions of some inferior geometrician. In prosecution of Dr. Bernard's plan, Dr. Gregory engaged soon after, with his colleague Halley, in the publication of the Conics of Apollonius; but he had proceeded but a little way in this undertaking when he died, in the 49th year of his age, at Maidenhead in Berkshire, A. D. 1710. To the genius and abilities of David Gregory, the most celebrated mathematicians of the age, Sir Isaac Newton, Dr. Halley, and Dr. Keill, have given ample testimonies. Besides those works published in his lifetime, he left in manuscript, *A Short Treatise of the Nature and Arithmetic of Logarithms*, which is printed at the end of Dr. Keill's translation of Commandine's Euclid; and a *Treatise of Practical Geometry*, which was afterwards translated, and published in 1745, by Mr. Maclaurin.

Dr. David Gregory married in 1695 Elizabeth, the daughter of Mr. Oliphant of Langtown in Scotland. By this lady he had four sons, of whom, the eldest, David, was appointed regius professor of modern history at Oxford by king George I. and died in 1767, in an advanced age, after enjoying for many years the dignity of dean of Christ church in that university.

GREGORY (Dr. John), professor of medicine in the university of Edinburgh, was the son of Dr. James Gregory, professor of medicine in King's college, Aberdeen, and grandson of James the inventor of the Gregorian telescope. He owed much in his

infant years, and during the whole course of his studies, to his cousin, the celebrated Dr. Reid of Glasgow. The rudiments of a classical education he received at the grammar-school of Aberdeen; and completed in King's college his studies in the Latin and Greek languages, and in the sciences of ethics, mathematics, and natural philosophy.

In 1742 Mr. Gregory went to attend the lectures at Edinburgh; and in the year 1745 for the same purpose went to Leyden. While at the latter place he received from the King's college of Aberdeen, his *alma mater*, an unsolicited degree in medicine; and soon after, on his return thither from Holland, he was elected professor of philosophy in the same university. In this capacity he read lectures during the years 1747, 1748, and 1749, on mathematics, on experimental philosophy, and on moral philosophy. In the end of 1749, however, he chose to resign his professorship of philosophy, his views being turned chiefly to the practice of physic, with which he apprehended the duties of this professorship, occupying a great portion of his time, too much interfered. Previously, however, to his settling as a physician at Aberdeen, he went for a few months to the Continent; a tour of which the chief motive was probably amusement, though, to a mind like his, certainly not without its profit in the enlargement of ideas, and an increased knowledge of mankind.

Some time after his return to Scotland, Dr. Gregory married, in 1752, Elizabeth daughter of William Lord Forbes; a lady of great beauty and wit. The field of medical practice at Aberdeen being at that time pre-occupied, our author determined to attempt the practice of his profession in London; whither accordingly he went in 1754; and being already known by reputation as a man of genius, he found an easy introduction to many persons of distinction both in the literary and polite world. The late George Lord Lyttelton was his friend and patron; and to that nobleman's advice the world is indebted for the publication of the *Comparative View of the State and Faculties of Man*, which made him first known as an author. Dr. Gregory likewise enjoyed the friendship of many of the most distinguished literary characters of his time.

In 1754 Dr. Gregory was chosen fellow of the royal society of London; and, daily advancing in the public esteem, it is not to be doubted, that, had he continued his residence in that metropolis, his professional talents would have found their reward in a very extensive practice. But the death of his brother, Dr. James Gregory, in November 1755, occasioning a vacancy in the professorship of physic in King's college, Aberdeen, which he was solicited to fill, he returned to his native country in the beginning of the following year, and took upon him the duties of that office, to which he had been elected in his absence.

Here our author remained till the end of the year 1764, when, urged by a very laudable ambition, and presuming on the reputation he had acquired as affording a reasonable prospect of success in a more extended field of practice, he changed his place of residence for Edinburgh. His friends in that metropolis had represented to him the situation of the college of medicine as favourable to his views of filling a professorial chair in that university; which accordingly he obtained in 1766, on the resignation of Dr. Rutherford, professor of the practice of physic. In the same year he had the honour of being appointed first physician to his majesty for Scotland on the death of Dr. Whytt.

On his first establishment in the university of Edinburgh, Dr. Gregory gave lectures on the practice of physic during the years 1767, 1768, and 1769. Afterwards, by agreement with Dr. Cullen, professor of the theory of physic, these two eminent

men gave alternate courses of the theory and of the practice. As a public speaker, Dr. Gregory's manner was simple, natural, and animated. Without the graces of oratory, which the subject he had to treat in a great degree precluded, he expressed his ideas with uncommon perspicuity, and in a style happily attuned between the formality of studied composition and the ease of conversation. It was his custom to premeditate, for a short time before entering the college, the subject of his lecture, consulting those authors to whom he had occasion to refer, and marking in short notes the arrangement of his intended discourse: then fully master of his subject, and confident of his own powers, he trusted to his natural facility of expression to convey those opinions which he had maturely deliberated. The only lectures which he committed fully to writing, were those introductory discourses which he read at the beginning of his annual course, and which in 1770 were published under the title of *Lectures on the Duties and Qualifications of a Physician*. In the year 1772 Dr. Gregory published *Elements of the Practice of Physic, for the use of Students*; a work intended solely for his own pupils, and to be used by himself as a text-book to be commented upon in his course of lectures. In an advertisement prefixed to this work, he signified his intention of comprehending in it the whole series of diseases of which he treated in his lectures on the Practice of Physic; but this intention he did not live to accomplish, having brought down the work no further than to the end of the class of Febrile Diseases.

Soon after the death of his wife, and, as he himself says, "for the amusement of his solitary hours," our author employed himself in the composition of that admirable tract, intitled, *A Father's Legacy to his Daughters*; a work which, though certainly never intended by its author for the public eye, it would have been an unwarrantable diminution of his fame, and a capricious refusal of a general benefit to mankind, to have limited to the sole purpose for which it was originally designed. These letters to his daughters were evidently written under the impression of an early death, which Dr. Gregory had reason to apprehend from a constitution subject to the gout, which had begun to show itself at irregular intervals even from the 18th year of his age. His mother, from whom he inherited that disease, died suddenly in 1770, while sitting at table; and Dr. Gregory had prognosticated for himself a similar death. The prediction, indeed, was too true; for having gone to bed on the 9th of February 1773, with no apparent disorder, he was found dead in the morning. His death had been instantaneous, and probably in his sleep; for there was not the smallest discomposure of limb or of feature, a perfect *Euthanasia*. Some time after his death, the professorship of the Theory of Medicine was bestowed upon his eldest son the present Dr. James Gregory; who has since succeeded to the Practical Chair of the late Dr. Cullen.

GRE-HOUND, often written GREY-HOUND. See CANIS. Among a litter of gre-hound puppies, the best are always those which are lightest. These will make the nimblest dogs as they grow up. The gre-hound is best for open countries where there is little covert. In these places there will sometimes be a course after a hare of two or three miles or more, and both the dogs and the game in sight all the while. It is generally supposed that the gre-hound bitch will beat the dog in running: but this seems to be an error; for the dog is both longer made, and considerably stronger than the bitch of the same kind. In the breeding these dogs the bitch is principally to be regarded; for it is found by experience, that the best dog and a bad bitch will not get so good puppies as an indifferent dog with a good bitch. The dog and bitch should be as nearly as may be of the same age; and for the breeding of fine and perfect dogs, they should

not be more than four years old. An old bitch may be used with a young dog, but the puppies of a young bitch and an old dog will never be good for any thing.

The proper exercise for a gre-hound is coursing him three times a-week, and rewarding him with blood; which will animate him in the highest degree, and encourage him to prosecute his game. But the hare also should ever have fair play. She should have the law, as it is called; that is, have leave to run about twelve score yards before the dog is slipped at her, that he may have some difficulty in the course, and not pick up the game too easily. If he kills the hare, he must never be suffered to tear her; but she must be taken from him, his mouth cleaned of the wool, and the liver and lights given him by way of encouragement. Then he is to be led home, and his feet washed with butter and beer, and about an hour after, he is to be fed. When the dog is to be taken out to course, he should have nothing in the morning but a toast and butter, and then he is to be kennelled till taken out to the field. The kennelling these dogs is of great use, always giving them spirit and nimbleness when they are let loose: and the best way of managing a fine gre-hound is, never to let him stir out of the kennel, except at the times of feeding, walking, or coursing.

GRENAILLE, a name given by the French writers to a preparation of copper, which the Chinese use as a red colour in some of their finest china, particularly for that colour which is called *oil-red*, or *red in oil*. The china-ware coloured with this is very dear. The manner in which they procure the preparation is thus: They have in China no such thing as silver-coined money, but they use in commerce bars or masses of silver; these they pay and receive in large bargains; and among a nation so full of fraud as the Chinese, it is no wonder that these are too often adulterated with too great an alloy of copper. They pass, however, in this state in the common payments. There are some occasions, however, such as the paying the taxes and contributions, on which they must have their silver pure and fine: on this occasion they have recourse to certain people, whose sole business it is to refine the silver, and separate it from the copper and the lead it contains. This they do in furnaces made for the purpose, and with very convenient vessels. While the copper is in fusion, they take a small brush, and dip the end of it into water; then striking the handle of the brush, they sprinkle the water by degrees upon the melted copper; a sort of pellicle forms itself by this means on the surface of the matter, which they take off while hot with pincers of iron, and immediately throwing it into a large vessel of cold water, it forms that red powder which is called the *grenaille*; they repeat the operation every time they in this manner separate the copper; and this furnishes them with as much of the *grenaille* as they have occasion for in their china works.

GRENOBLE, a handsome, large, populous, and ancient town of France, in the department of Isere and late province of Dauphiny, with a bishop's see. It contains a great number of handsome structures, particularly churches. The cathedral is a fine ancient building in the Gothic taste; and St. Andrew's church is adorned with a curious spire, and a tomb of excellent workmanship. The leather and gloves that are made here are highly esteemed. It is seated on the river Isere, over which are two bridges to pass into that part called Perreire, a large street on the side of the river. It is 27 miles S. of Chambery, and 105 W. by N. of Turin. Lon. 5. 49. E. Lat. 45. 12. N.

GRESHAM (Sir Thomas), an opulent merchant of London, descended from an ancient and honourable family of Norfolk, was born in 1519. He was, as his father had been before him,

appointed king's agent at Antwerp, for taking up money of the merchants; and in 1551 he removed to that city with his family. This employment was suspended on the accession of queen Mary: but, on proper representations, was restored to him again. Queen Elizabeth conferred the honour of knighthood upon him, and made him her agent in foreign parts. It was at this time he thought proper to provide himself with a mansion-house in the city, suitable to his station and dignity; with which intention he built a large house on the west side of Bishopsgate-street, afterwards known by the name of *Gresham-college*. His father had proposed building a house or exchange for the merchants to meet in, instead of walking in the open street; but this design remained for the son to accomplish. Sir Thomas went beyond his father: he offered, if the citizens would provide a proper piece of ground, to build a house at his own expence; which being accepted, he fulfilled his promise after the plan of the exchange at Antwerp. When the new edifice was opened, the queen (Jan. 29, 1570) came and dined with the founder; and caused a herald with a trumpet to proclaim it by the name of the *Royal Exchange*. In pursuance also of a promise to endow a college for the profession of the seven liberal sciences, he made a testamentary disposition of his house in London for that purpose: leaving one moiety of the royal exchange to the corporation of London, and the other to the mercers' company, for the salaries of seven lecturers in divinity, law, physic, astronomy, geometry, music, and rhetoric, at 50*l.* each *per annum*. He left several other considerable benefactions, and died in 1579. As to the college, it has been pulled down within these 18 or 20 years, in consequence of an application to parliament from the city, and the excise-office erected in its place. The lectures are read, or rather hurried through, in a chamber over the Royal Exchange. Those who have drawn Sir Thomas's character observe, that he had the happiness of a mind every way suited to his fortune, generous and benign; ready to perform any good actions, and encourage them in others. He was a great friend and patron of our celebrated martyrologist John Fox. He was well acquainted with the ancient and several modern languages; he had a very comprehensive knowledge of all affairs relating to commerce, whether foreign or domestic; and his success was not less, being in his time esteemed the richest commoner in England. He transacted queen Elizabeth's mercantile affairs so constantly, that he was called *the royal merchant*: and his house was sometimes appointed for the reception of foreign princes upon their first arrival in London.

GREटना-GREEN, a village of Dumfriesshire in Scotland, near the mouth of the river Esk. It has been long noted as the resort of those young gentlemen and ladies in England, who choose to be married notwithstanding the prohibitions of their parents and guardians. The ceremony is performed by a blacksmith.

GREVILLE (Fulke), lord Brook, of Beauchamp's Court in Warwickshire, a poet and miscellaneous writer, was born in the year 1554, and descended from the noble families of Beauchamps of Powick and Willoughby de Brook. In company with his cousin Sir Philip Sidney, he began his education at a school in Shrewsbury: thence he went to Oxford, where he remained for some time a gentleman commoner, and then removed to Trinity-college in Cambridge. Having left the university, he visited foreign courts, and thus added to his knowledge of the ancient languages a perfect knowledge of the modern. On his return to England he was introduced to queen Elizabeth by his uncle Robert Greville, at that time in her majesty's service; and by means of Sir Henry Sidney, lord president of Wales, was nominated to some lucrative employments in that principality.

In the year 1581, when the French commissioners who came to treat about the queen's marriage with the duke of Anjou were sumptuously entertained with tilts and tournaments, Mr. Greville, who was one of the challengers, so signalized himself, as to "win the reputation of a most valiant knight." He continued a constant attendant at court, and a favourite with the queen to the end of her reign; during which he obtained the office of treasurer of marine causes, also a grant of the manor of Wedgnoek, and likewise the honour of knighthood. In this reign he was several times elected member for the county of Warwick; and from the journals of the house seems to have been a man of business, as his name frequently appears in committees.

On the accession of king James I. he was installed knight of the Bath; and soon after obtained a grant of the ruinous castles of Warwick, which he repaired at a considerable expence, and where he probably resided during the former part of this reign: but in the year 1614, the twelfth of James I. he was made under treasurer and chancellor of the exchequer, one of the privy council, and gentleman of the bed-chamber; and in the year 1620 was raised to the dignity of a baron by the title of lord Brook of Beauchamp's Court. He was also privy-counsellor to king Charles I. in the beginning of whose reign he founded a history-lecture in Cambridge.

Having now attained the age of 74, through a life of continued prosperity, universally admired as a gentleman and a scholar, he fell by the hand of an assassin, one of his own domestics, who immediately stabbed himself with the same weapon with which he had murdered his master. This fellow's name was Haywood; and the cause is said to have been a severe reprimand for his presumption in upbraiding his master for not providing for him after his death. It seems he had been witness to lord Brook's will, and knew the contents. Some say he stabbed him with a knife in the back, others with a sword. This affair happened at Brooke-house in Holborne. Lord Brooke was buried with great pomp in St. Mary's church at Warwick, in his own vault, over which he had erected a monument of black and white marble, ordering at his death the following inscription to be engraved upon the tomb: "Fulke Greville, servant to queen Elizabeth, counsellor to king James, and friend to Sir Philip Sidney. *Trophæum Peccati*." He wrote several works both in verse and prose; among which are, 1. Two tragedies, *Alaham* and *Mustapha*. 2. A Treatise of Human Learning, &c. in verse, folio. 3. The Life of Sir Philip Sidney. 4. An Inquisition upon Fame and Honour, in 86 stanzas. 6. *Cæcilia*, a collection of 109 songs. 7. His Remains, consisting of political and philosophical poems.

GREVIUS. See **GRÆVIUS**.

GREW (Nehemiah), a learned English writer, in the 17th century, had a considerable practice as a physician in London, and succeeded Mr. Oldenburgh in the office of secretary to the royal society. In this capacity, pursuant to an order of council, he drew up a catalogue of the natural and artificial rarities belonging to the society, under the title of *Musæum Regalis Societatis*, &c. 1681. He also wrote, besides several pieces in the Philosophical Transactions, 1. The Comparative Anatomy of the Stomach and Guts, folio. 2. The Anatomy of Plants, folio. 3. *Tractatus de fulis cathartici natura et usu*. 4. *Cosmologia Sacra*, or a Discourse of the Universe as it is the Creature and Kingdom of God, folio. He died suddenly in 1721.

GREWIA, in botany; a genus of the polyandria order, belonging to the gynandria class of plants, and in the natural method ranking under the 37th order, *Columniferae*. The calyx is pentaphyllous; there are five petals, each with a nectariferous scale at the base; the berry is quadrilocular. The *Species* are,

1. The *occidentalis*, with oval crenated leaves, has long been preserved in many curious gardens both in England and Holland. It is a native of the Cape of Good Hope, and grows to the height of 10 or 12 feet. The stem and branches greatly resemble those of the small-leaved elm, the bark being smooth, and of the same colour with that when young. The leaves are also very like those of the elm, and fall off in autumn. The flowers are produced singly along the young branches from the wings of the leaves, and are of a bright purple colour. 2. The *Africana*, with oval spear-shaped serrated leaves, is a native of Senegal in Africa, from whence its seeds were brought by Mr. Adanson. In this country it rises with a shrubby stalk five or six feet high, sending out many lateral branches, with a brown hairy bark, and garnished with spear-shaped serrated leaves; but the plants have not flowered in Britain.

The first sort, though a native of a warm climate, will bear the open air in this country; only requiring to be sheltered in a green-house during the winter-time. It may be propagated by cuttings or layers planted in pots filled with soft loamy earth. The second sort is tender, and must be kept constantly in a warm bark-stove. In summer, they require a large share of the free air to be admitted to them, and should have water three or four times a-week in warm weather; but in the winter they must be sparingly watered. The negroes of Senegal consider a decoction of the bark of this last species, as a never-failing remedy against venereal complaints.

GREY, or GRAY colour. See GRAY.

GREY (Lady Jane), a most illustrious and unfortunate lady, descended of the blood-royal of England by both parents, was the eldest daughter of Henry Grey marquis of Dorset and Frances the daughter of Charles Brandon lord Suffolk, by Mary the dowager of Louis XII. king of France, who was the youngest daughter of Henry VII. king of England. She was born in the year 1537, at Broadgate, her father's seat in Leicestershire. She discovered an early propensity to all kinds of good literature; and having a fine genius, improved under the tuition of Mr. Elmer, she made a most surprising progress in the languages, arts, and sciences. She understood perfectly both kinds of philosophy, and could express herself very properly at least in the Latin and Greek tongues; and we are informed by Sir Thomas Chaloner (in Strype's Memorials, Vol. III. p. 93.) that she was well versed in Hebrew, Chaldee, Arabic, French, and Italian; "and (he adds) she played well on instrumental music, wrote a curious hand, and was excellent at the needle." Chaloner also tells us, that she accompanied her musical instruments with a voice exquisitely sweet in itself, assisted by all the graces that art could bestow.

In the year 1553, the dukes of Suffolk and Northumberland, who were now, after the fall of Somerset, arrived at the height of power, began, on the decline of the king's health, to think how to prevent that reverse of fortune which, as things then stood, they foresaw must happen upon Edward's death. To obtain this end, no other remedy was judged sufficient but a change in the succession of the crown, and transferring it into their own families, by rendering Lady Jane queen. Those most excellent and amiable qualities which had rendered her dear to all who had the happiness to know her, joined to her near affinity to the king, subjected her to become the chief tool of an ambition so notoriously not her own. Upon this very account she was married to lord Guilford Dudley, fourth son of the duke of Northumberland, without discovering to her the real design of the match; which was celebrated with great pomp in the latter end of May, so much to the king's satisfaction, that he contributed bounteously to the expence of it from the royal wardrobe. The young king Edward VI. died in July following; and our fair scholar, with infinite reluctance, overpowered

by the solicitations of her ambitious friends, allowed herself to be proclaimed queen of England, on the strength of a deed of settlement extorted from that prince by her father-in-law the duke of Northumberland, which set aside the succession of queen Mary, queen Elizabeth, and Mary queen of Scots. Her regal pageantry continued but a few days. Queen Mary's undoubted right prevailed; and the unfortunate Lady Jane Grey and her husband were committed to the Tower, and on the 13th of November arraigned and found guilty of high treason. On the 12th of February following they were both beheaded on Tower-hill. Her magnanimity in this dreadful catastrophe was astonishing. Immediately before her execution, she addressed herself to the weeping multitude with amazing composure and coherence: she acknowledged the justice of the law, and died in charity with that wretched world which she had so much reason to execrate. Thus did the pious Mary begin her reign with the murder of an innocent young creature of 18; who for simplicity of manners, purity of heart, and extensive learning, was hardly ever equalled in any age or country. But, alas! Jane was an obstinate heretic.—A few days before her execution, Fleckenham, the queen's chaplain, with a pious intention to rescue her poor soul from eternal misery, paid her frequent visits in the Tower, and used every argument in his power to convert her to the Popish religion: but he found her so much his superior in argument, that he gave up the contest; resigning her body to the block, and her soul to the devil.

Her writings are, 1. Four Latin Epistles; three to Bullenger, and one to her sister lady Catharine. The last was written, the night before her execution, in a blank leaf of a Greek Testament. Printed in a book intitled *Epistolæ Helveticæ Reformato-ribus, vel ad eos scriptæ*, &c. Tiguri, 1742, 8vo. 2. Her Conference with Fleckenham. (Ballard). 3. A letter to Dr. Harding, her father's chaplain. Printed in the *Phoenix*, vol. ii. p. 28. 4. A Prayer for her own use during her confinement. In Fox's *Acts and Monuments*. 5. Four Latin verses; written in prison with a pin. They are as follows:

Non aliæna putes, homini quæ obtingere possunt:

Sors bodierna mihi, tunc erit illa tibi. JANE DUDLEY.

Deo juvante, nil nocet livor malus:

Et non juvante, nil juvat labor gravis.

Post tenebras spero lucem.

6. Her Speech on the Scaffold. (Ballard). It began thus: "My Lords, and you good Christian people who come to see me die; I am under a law, and by that law, as a never-erring judge, I am condemned to die: not for any thing I have offended the queen's majesty; for I will wash my hands guiltless thereof, and deliver to my God a soul as pure from such trespasses as innocence from injustice; but only for that I consented to the thing I was enforced unto, constraint making the law believe I did that which I never understood," &c.—Hollinshed, Sir Richard Baker, Bale, and Fox, tell us that she wrote several other things, but do not mention where they are to be found.

GREY-Hound. See GRE-Hound.

GRIAS, in botany; a genus of the monogynia order, belonging to the polyandria class of plants, and in the natural method ranking with those of which the order is doubtful. The corolla is tetrapetalous; the calyx quadrid; the stigma sessile and cruciform: the fruit is a plum with an eight-furrowed kernel. There is but one species, the caulitlora or anchovy-pear, a native of Jamaica. The leaves are nearly oval, and about three feet long. It has a straight stem, upon the upper part of which come forth the flowers. The fruit is large, and contains a stone with eight furrows. These fruits are eaten by the inhabitants.

GRIBALDUS (Matthew), a learned civilian of Padua, left Italy in the 16th century, in order to make a public profession of the Protestant religion. After having been for some time professor of the civil law at Tübingen, he was obliged to make his escape to avoid the punishment he would have incurred had he been convicted of differing from Calvin with respect to the doctrine of the Trinity; but he was seized at Berne, where he would have met with very severe treatment had he not pretended to renounce his opinions; but as he relapsed again, he would certainly have been put to death, had he not died of the plague in 1664. He wrote *De methodo ac ratione studendi in jure civili*; and several other works which are esteemed.

GRIBNER (Michael Henry), a learned civilian of Germany, was born at Leipzig in 1682. After writing some time in the journal of Leipzig, he was made professor of law at Wittenberg: whence he passed to Dresden, and was at last recalled to Leipzig to succeed M. Mencke. He died in 1734. Besides several academical dissertations, he wrote, 1. *Principia processus judicarii*. 2. *Principia jurisprudentiæ naturalis*, a small work much esteemed: 3. *Opuscula juris publici et privati*.

GRIELUM, in botany; a genus of the pentagynia order, belonging to the decandria class of plants. The calyx is quinquefid; there are five petals; the filaments persisting; and there are five monospermous seed-cases.

GRIERSON (Constantia), born of poor parents in the county of Kilkenny in Ireland, was one of the most learned women on record, though she died at the age of 27, in 1733. She was an excellent Greek and Latin scholar, and understood history, divinity, philosophy, and mathematics. She proved her skill in Latin by her dedication of the Dublin edition of Tacitus to lord Carteret, and by that of Terence to his son; to whom she also addressed a Greek epigram. She wrote many elegant English poems, several of which were inserted by Mrs. Barber among her own. When lord Carteret was lord lieutenant of Ireland, he obtained a patent for Mr. Grierson to be the king's printer; and, to reward the uncommon merit of his wife, caused her life to be included in it.

GRIFFON, **GRYPHUS**, γρυψ, in the natural history of the ancients, the name of an imaginary bird of prey, of the eagle kind. They represented it with four legs, wings, and a beak; the upper part representing an eagle, and the lower a lion; they supposed it to watch over gold mines, hidden treasures, &c. This animal was consecrated to the sun; and the ancient painters represented the chariot of the sun as drawn by griffons. M. Spanheim observes the same of those of Jupiter and Nemesis. The griffon in Scripture is that species of the eagle called in Latin *osifraga*, the "osprey;" and פֶּרֶם, of the verb פָּרַם *paras*, "to break." The griffon is frequently seen on ancient medals: and is still borne in coat-armour. Guillim blazons it rampant; alleging, that any very fierce animal may be so blazoned as well as the lion. Sylvester, Morgan, and others, use the terms *segriciant* instead of rampant. The griffon is also an ornament of architecture in constant use among the Greeks, and was copied from them, with the other elegancies of architectural enrichments, by the Romans. See **SPHYNX**.

GRIFLEA, in botany; a genus of the monogynia order, belonging to the octandria class of plants, and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is quadrifid; and there are four petals, one from each incisure of it. The filaments are very long, ascending or turning upwards; the capsule is globose, superior, unilocular, and polyspermous.

GRIMALDI (Francisco), an eminent painter, generally known by the appellation of *Bolognese*, was born at Bologna in 1606, where he became a disciple of Annibal Caracci, and proved an honour to that illustrious master. From the school of Annibal he went to complete his studies at Rome, and im-

proved himself daily, by copying the works of those artists in which he observed the greatest excellence, until his superior talents recommended him to the favour of Innocent X. who afforded him immediate opportunities of exerting his genius in the gallery of his palace at Monte Cavallo, and also in the Vatican. The merit of his performances very soon engaged the attention and applause of the public, and increased the number of his admirers and friends; among whom were the prince Pamphilio, and many of the principal nobility of Rome. His reputation reached cardinal Mazarine at Paris, who sent for him, settled a large pension on him, and employed him for three years in embellishing his palace and the Louvre, by the order of Louis XIII. The troubles of the state, and the clamours raised against the cardinal, whose party he warmly espoused, put him so much in danger, that his friends advised him to retire among the Jesuits. He did so, and was of use to them; for he painted them a decoration for the exposition of the sacrament during the holy days, according to the custom of Rome. This piece was mightily relished at Paris: the king honoured it with two visits, and commanded him to paint such another for his chapel at the Louvre. Grimaldi after that returned to Italy; and on his arrival at Rome found his great patron Innocent X. dead: but his two successors Alexander VII. and Clement IX. honoured him equally with their friendship, and found him variety of employment. Grimaldi was amiable in his manners, as well as skilful in his profession: he was generous without profusion, respectful to the great without meaness, and charitable to the poor. The following instance of his benevolence may serve to characterise the man. A Sicilian gentleman, who had retired from Messina with his daughter during the troubles of that country, was reduced to the misery of wanting bread. As he lived over-against him, Grimaldi was soon informed of it; and in the dusk of the evening, knocking at the Sicilian's door, without making himself known, tossed in money and retired. The thing happening more than once, raised the Sicilian's curiosity to know his benefactor; who finding him out, by hiding himself behind the door, fell down on his knees to thank the hand that had relieved him. Grimaldi remained confused, offered him his house, and continued his friend till his death. He died of a dropsy at Rome in 1680, and left a considerable fortune among six children. The genius of Grimaldi directed him chiefly to landscape, which he executed most happily. His colouring is strong; his touch light and delicate: his situations are uncommonly pleasing; and the leasing of his trees is admirable. Sometimes, indeed, his colouring appears rather too green: but those landscapes, which he painted in the manner of the Caracci, may serve as models for all those who admire the style of that school; and he designed his figures in an elegant taste. The pictures of this master are very unfrequent, especially those of his best time; and whenever they are to be purchased, they sell for large prices. Of his children above mentioned, the youngest, named *Alexander*, proved a good painter, in the same style and taste with his father, though very far inferior to him: some of the pictures of Alexander, however, are either artfully, or injudiciously, ascribed to Francisco.

Great GRIMSBY, a large borough of Lincolnshire, with a market on Wednesday and Saturday. It had formerly a castle and two parish churches, with a commodious harbour, now almost choked up. It has now only one church, a large handsome structure, like a cathedral. It is 35 miles N. E. by E. of Lincoln, and 170 N. of London. Lon. 0. 6. E. Lat. 53. 34. N.

GRINDING, or **TRITURATION**, the act of breaking or comminuting a solid body, and reducing it into powder. See **PULVERISATION** and **LEVIGATION**. Painters' colours are ground on a marble or porphyry, either with oil or gum water. *Grinding* is also used for rubbing or wearing off the irregular parts

of the surface of a body, and reducing it to the destined figure, whether that be flat, concave, or the like. The grinding and polishing of glass is a considerable art; for which see *GLASS-Grinding*.

GRINDON-RIGG, a river in Northumberland, near Berwick, famous for the victory which was gained over the Scots in 1558 by the earl of Northumberland and his brother, when many of the Scots were drowned in this river. On a rising ground near Grindon, about a quarter of a mile S. from Sandybank, are four upright stone pillars, funeral monuments of the chieftains slain in that action.

East **GRINSTEAD**, a borough in Suffex, with a market on Thursday. The assizes for the county are sometimes held here. It is 18 miles N. of Lewes, and 29 S. of London. Lon. 0. 2. E. Lat. 51. 12. N.

GRIPSWALD, a strong and considerable town of Germany, in Pomerania, formerly imperial, but now subject to the Swedes, with a good harbour, and a university. It is seated near the sea, 15 miles S. E. of Stralsund, and 55 N. W. of Stettin. Lon. 13. 44. E. Lat. 54. 4. N.

GRISGRIS, a superstition greatly in vogue among the negroes in the interior parts of Africa. The grisgris, according to Le Maire, are certain Arabic characters mixed with magical figures drawn by the Marabuts or priests upon paper. Labat affirms, that they are nothing else than scraps of the alcoran in Arabic; but this is denied by Barbut, who brought over one of these grisgris to Europe, and showed it to a number of persons deeply skilled in oriental learning. None of these could find the least trace of any character they understood. Yet, after all, this might be owing to the badness of the hand-writing; and the words are probably of the Mandingo language, though the characters are an attempt to imitate the Arabic. The poorest negro never goes to war without his grisgris, as a charm against wounds; and if it proves ineffectual, the priest transfers the blame on the immorality of his conduct. These priests invent grisgris against all kinds of dangers, and in favour of all desires and appetites; by virtue of which the possessors may obtain or avoid whatever they like or dislike. They defend them from storms, enemies, diseases, pains, and misfortunes; and preserve health, long life, wealth, honour, and merit, according to the Marabuts. No clergy in the world are more honoured and revered by the people than these impostors are by the negroes; nor are any people in the world more impoverished by their priests than these negroes are, a grisgris being frequently sold at three slaves and four and five oxen. The grisgris intended for the head is made in the form of a cross, reaching from the forehead to the neck behind, and from ear to ear; nor are the arms and shoulders neglected. Sometimes they are planted in their bonnets in the form of horns; at other times, they are made like serpents, lizards, or some other animals, cut out of a kind of pasteboard, &c. There are not wanting Europeans, and otherwise intelligent seamen and merchants, who are in some degree infected with this weakness of the country, and believe that the negro forcerers have an actual communication with the devil, and that they are filled with the malignant influence of that evil spirit, when they see them distort their features and muscles, make horrid grimaces, and at last imitate all the appearance of epileptics.

GRISONS, a people situated among the Alps, and allies of the Swiss. Their country is bounded on the north by the counties of Surgans and Bludenz, the canton of Glaris, and the principality of Lichtenstein; on the south by the canton's Italian bailiwicks, the county of Chavanne, and the Valteline; on the east by the territories of Venice and Milan; and on the west by some of the Italian bailiwicks, and the canton of Uri. It is divided into three leagues, viz. the *Grison* or *grey league*, the *league of the house of God*, and that of the *ten jurisdictions*;

which unite and form one republic. The two first lie towards the south, and the third towards the north. The length of the whole is above 70 miles, and the breadth about 60. The inhabitants are said to have had the name of *Grifons* from the grey coats they wore in former times. This country, lying among the Alps, is very mountainous; but the mountains yield good pasture for cattle, sheep and goats, with some rye and barley: in the valleys there is plenty of grain, pulse, fruits, and wine. This country also abounds with hogs and wild-fowl; but there is a scarcity of fish and salt, and their horses are mostly purchased of foreigners. The principal rivers are the Rhine, the Inn, and the Adda. Here are also several lakes, most of which lie on the tops of the hills. The language of the Grifons is either a corrupt Italian or the German. Each of the leagues is subdivided into several lesser communities, which are so many democracies; every male above 16 having a share in the government of the community, and a vote in the election of magistrates. Deputies from the several communities constitute the general diet of the Grifon leagues, which meets annually, and alternately at the capital of each league; but they can conclude nothing without the consent of their constituents. This country was anciently a part of Rhetia. After the extinction of the Roman empire in the west, it was some time subject to its own dukes, or those of Swabia. Then the bishop of Coire, and other petty princes, dependent on the emperors of Germany, became masters of great part of it: at last, by the extinction of some, purchase, voluntary grants, and force, it got rid of all its lords, and erected itself into three distinct republics, each of which, as we observed already, is subdivided into a certain number of communities, which are a sort of republics, exercising every branch of sovereignty, except that of making peace or war, sending embassies, concluding alliances, and enacting laws relating to the whole country, which belong to the provincial diets of the several leagues. The communities may be compared to the cities of Holland, and the diets of the several leagues to the provincial states. The particular diets are composed of a deputy from each community; and both in them and the communities every thing is determined by a majority of votes. In the communities, every male above 16 has a vote. Besides the annual provincial diets for choosing the chiefs and other officers, and deliberating on the affairs of the respective leagues, there are general diets for what concerns all the three leagues or whole body. In both these, the representatives can do nothing of themselves, but are tied down to the instructions of their principals. There is a general seal for all the three leagues; and each particular league has a separate seal. Besides the stated times of meeting, extraordinary diets are sometimes summoned, when either the domestic affairs of the state or any foreign minister require it. In the general diets, the Grey League has 28 votes; that of the House of God, 23; and that of the Ten Jurisdictions, 15. These leagues, at different times, have entered into close alliances with the neighbouring cantons and their associates. The bailiwicks belonging in common to the three leagues are those of the Valteline, Chavanne, Bormio, Meyenfeld, Malans, and Jennins; the officers of which are nominated successively by the several communities every two years. The yearly revenue arising to the Grifons from their bailiwicks is said to amount to about 13,500 florins. The public revenues altogether are but small, though there are many private persons in the country that are rich. However, in case of any extraordinary emergency, they tax themselves in proportion to the necessity of the service and the people's abilities. They have no regular troops, but a well-disciplined militia; and upon occasion, it is said, can bring a body of 30,000 fighting men into the field: but their chief security arises from the narrow passes and high mountains by which they are surrounded.

Of the jurisprudence, religion, &c. of the Grifons, the follow-

ing account is given by Mr. Coxe in his Travels in Switzerland. Throughout the three leagues the Roman law prevails, modified by the municipal customs. The courts of justice in each community are composed of the chief magistrate, who presides, and a certain number of jurymen, chosen by the people: they have no regular salaries, but receive for their attendance a small sum, arising in some communities from the expences of the process, which are defrayed by the criminals; in others from a share of the fines. They enjoy the power of pardoning or diminishing the penalty, and of receiving a composition in money. This mode of proceeding supposes what is as absurd in theory as it is contrary to experience, that judges will incline to mercy when it is their interest to convict; or will impartially inflict punishment, even when injurious to their own private advantage. The prisoners are examined in private; frequently tortured for the purpose of forcing confession, when the judges either divide the fines, or remit the punishment for a composition. In some districts a criminal trial is a kind of festival to the judges, for whom a good repast is provided at the expence of the prisoner if convicted; and thus the following allusion, in Garth's Dispensary, applied with more wit than truth to our courts of justice, is literally fulfilled: "*And wretches hang, that jurymen may dine.*" Capital punishments, however, are extremely rare; a circumstance arising not from a want of severity in the penal statutes, or from a propensity to mercy in the judges, but because the latter draw more advantages from fining than executing an offender. In a word, to use the expression of Burnet, which is as true at present as it was in his time, "Many crimes go unpunished, if the persons who commit them have either great credit or much money." It is remarkable, that torture is more frequently applied, and for smaller delinquencies, in these independent republics, than in the subject provinces. The infliction of it depends entirely upon the arbitrary will of the judges; a majority of whom may order it for an offence which is not capital, nor even punishable by corporal penalties. Thus it is not uncommon, in those communities where fines are divided among the judges, to torture women of loose conduct, for the purpose of compelling them to confess with whom they have been connected; for as such offences are punishable by fines, the more persons are convicted, the larger share of money is distributed among the judges for the trouble of their attendance. Even in the districts where the fines are paid to the community, torture is often no less wantonly inflicted, because, when the prisoner is not found guilty, the expences of the process fall upon the public, and the judges receive little emolument. Even in the civil courts most causes are decided by bribing the judges; and appeals in those communities, wherein they are admitted, scarcely serve any other end than to enlarge the sphere of corruption. Coire, and a few other places, are excepted from this general reflection.

The religion of the Grisons is divided into catholic and reformed. The doctrines of the reformation were first preached about the year 1524, and received at Fläsch, a small village in the Ten Jurisdictions upon the confines of Sargans; from thence they were extended to Mayenfeld and Malantz, and soon afterwards through the whole valley of Pretigau. The new opinions spread with such celerity, that before the end of the 16th century they were embraced by the whole league of the Ten Jurisdictions (excepting part of the community of Alvenew), the greatest part of the House of God, and a few communities in the Grey League. The difference of religion nearly excited a civil war between the two sects, as well at the first introduction of the reformation as at the beginning of the troubles in the Valteline. In the latter instance, the two parties rose in arms; but the Catholics being overpowered by the Protestants, matters were amicably adjusted. Since that period all religious concerns have been regulated with perfect cordiality. According

to the general consent of the three leagues, each community being absolute within its little territory, has the power of appointing its own particular worship, and the inhabitants are free to follow either the Catholic or Reformed persuasion. In the administration of civil affairs religion has no interference: the deputies of the general diet may be members of either communion, as chosen by the communities which they represent. By this moderate and tolerating principle, all religious dissensions have been suppressed as much as possible; and the most perfect amity subsists between the two sects.

In spiritual concerns, the Catholics for the most part are under the jurisdiction of the bishop of Coire. For the affairs of the Reformed churches, each league is divided into a certain number of districts, the ministers whereof assemble twice every year: these assemblies are called *colloquia*. Each colloquium has its president, and each league a superintendant called a *dean*. The supreme authority in spiritual concerns is vested in the synod, which is composed of the three deans, and the clergy of each league; the synod assembles every year alternately in each of the three leagues. Candidates for holy orders are examined before the synod. The necessary qualifications for admission into the church ought to be the knowledge of Hebrew, Greek, and Latin; but this rule is not strictly adhered to; many being ordained without the least acquaintance with either of those languages. Formerly Latin was solely used, as well in the debates of the synod as for the purpose of examining the candidates: but at present that tongue grows more and more into disuse, and German is employed in its stead.

The number of reformed parishes in the whole three leagues amounts to 135, in the following proportion: In the Grey League 46, in that of God's House 53, and in the League of Ten Jurisdictions 36. The ministers of these churches enjoy but very small salaries. The richest benefices do not perhaps yield more than 20*l.* or at most 25*l.* *per annum*, and the poorest sometimes scarcely 6*l.* This scanty income is attended with many inconveniences. It obliges the clergy who have families to follow some branch of traffic, to the neglect of their ecclesiastical studies, and to the degradation of the professional character. Another inconvenience is superadded to the narrowness of their income. In most communities the ministers, though confirmed by the synod, are chosen by the people of the parish, and are solely dependent on their bounty. For these reasons, the candidates for holy orders are generally extremely ignorant. They cannot support that expence which is requisite to pursue their studies; they are not animated with the expectation of a decent competence; and, from the dependent mode of their election, are not encouraged to deserve their promotion by a consistent dignity of character.

GRIST, in country affairs, denotes corn ground, or in a state ready for grinding.

GRIT (*argillaceous*), a genus of argillaceous earths. Its texture is more or less porous, equable, and rough to the touch. It does not give fire with steel, nor effervesce with acids. When freshly broken and breathed upon, it exhales an earthy smell. Mr. Kirwan mentions two kinds; one from Hollington near Uttoxeter, of a yellowish or whitish grey, and about the specific gravity of 2283. Another, from Kneperly in Staffordshire, is of the specific gravity of 2568, and so insusible as to be used for fire stones. According to Fabroni the grit-stone is of greater or less hardness, mostly of a grey, and sometimes of a yellowish colour, composed of a siliceous and micaceous sand, but rarely of a sparry kind; with greater or smaller particles closely compacted by an argillaceous cement. It gives some sparks with steel, is indissoluble for the most part in acids, and vitrifiable in a strong fire. It is used for millstones and whetstones; and sometimes for filtering stones and for building.

GROAT, an English money of account, equal to four pence

Other nations, as the Dutch, Polanders, Saxons, Bohemians, French, &c. have likewise their groats, groots, groches, gros, &c. In the Saxon times, no silver coin bigger than a penny was struck in England, nor after the Conquest, till Edward III. who, about the year 1351, coined groffes, i. e. *groats*, or great pieces, which went for 4d. a-piece: and so the matter stood till the reign of Henry VIII. who in 1504 first coined shillings.

GROATS, in country affairs, oats after the hulls are off, or great oat-meal. In London they are called GRITS.

GROCERS, anciently were such persons as engrossed all merchandize that was vendible; but now they are incorporated, and make one of the companies of the city of London, which deals in sugar, foreign fruits, spices, &c.

GRODNO, the principal town, though not the capital, of Lithuania. It is a large and straggling place, but contains no more than 3000 Christians, excluding the persons employed in the manufactures, and 1000 Jews. It has greatly the appearance of a decayed town; containing a mixture of wretched hovels, falling houses, and ruined palaces, with magnificent gateways, remains of its ancient splendour. A few habitations in good repair make the contrast more striking. Some remains still exist of the old palace in which the kings used to reside during the holding of the diets. It stood on a hill; opposite to which is the new palace, built, but never inhabited, by Augustus III. In this palace are the apartments where the diets are sometimes held; particularly the last, in 1793, which was compelled, at the point of the bayonet, to consent to the second partition of Poland. Here is a college and physic garden; the king of Poland having established a royal academy of physic for Lithuania. Grodno is seated partly in a plain, on the river Niemen, and partly on a mountain, 125 miles N. E. of Warsaw. Lon. 24. 15. E. Lat. 53. 28. N.

GROGRAM, a kind of stuff made of silk and mohair.

GROIN, that part of the belly next the thigh. In vol. 67 of the Philosophical Transactions is an account of a remarkable case, where a peg of wood was extracted from the groin of a young woman of 21, after it had remained 16 years in the stomach and intestines, having been accidentally swallowed when she was about five years of age.

GROIN, among builders, is the angular curve made by the intersection of two semi-cylinders or arches, and is either regular or irregular. A *regular* groin is when the intersecting arches, whether semicircular or semielliptical, are of the same diameters and heights. An *irregular* groin is where one of the arches is semicircular and the other semielliptical.

GROMWELL, in botany. See LITHOSPERMUM.

GRONINGEN, a rich, populous, and handsome town of the Netherlands, capital of a lordship of the same name, which is one of the United Provinces, with a citadel and a university. It is seated on the rivers Hunes and Aa, 10 miles from the sea, and 85 N. E. of Amsterdam. Lon. 6. 31. E. Lat. 53. 10. N.

GRONINGEN, one of the Seven United Provinces, bounded on the E. by the river Ems, which separates it from E. Friesland, on the W. by Friesland, on the N. by the German ocean, and on the S. by Overijssel. It is divided into two parts, of which the town of Groningen and its district are one, and the Ommerslands the other. These two bodies assembled by their deputies, with the states of the province, make the sovereignty. Its government is not unlike that of ancient Rome. The excellence of this country consists in pastures, which feed a great number of large horses, fit for the coach.

GRONOVIA, in botany: a genus of the monogynia order, belonging to the pentandria class of plants, and in the natural method ranking under the 34th order, *Cucurbitacea*. There are five petals and stamina inserted into a campanulated calyx; the berry is dry, monospermous, and inferior.

GRONOVIVS (John Frederic), a very learned critic, was

born at Hamburgh in 1613; and having travelled through Germany, Italy, and France, was made professor of polite learning at Deventer, and afterwards at Leyden, where he died in 1671. He published, 1. *Diatriba in Statii*, &c. 2. *De sefertii*. 3. Correct editions of Seneca, Statius, T. Livy, Pliny's Natural History, Tacitus, Aulus Gellius, Phaedrus's Fables, &c. with notes; and other works.

GRONOVIVS (James), son of the preceding, and a very learned man, was educated first at Leyden, then went over to England, where he visited the universities, consulted the curious MSS. and formed an acquaintance with several learned men. He was chosen by the grand duke to be professor at Pisa, with a considerable stipend. He returned into Holland, after he had resided two years in Tuscany, and consulted the MSS. in the Medicean library. In 1679, he was invited by the curators of the university to a professorship; and his inaugural dissertation was so highly approved of, that the curators added 400 florins to his stipend, and this augmentation continued to his death in 1716. He refused several honourable and advantageous offers. His principal works are, *The treasure of Greek antiquities*, in 13 vols. folio; and a great number of dissertations, and editions of ancient authors. He was compared to Schioppus for the virulence of his style; and the severity with which he treated other great men who differed from him exposed him to just censure.

GROOM, a name particularly applied to several superior officers belonging to the king's household, as groom of the chamber, groom of the stole. See STOLE and WARDROBE.

GROOM is more particularly used for a servant appointed to attend on horses in the stable. The word is formed from the Flemish *grom*, "a boy."

GROOVE, among miners, is the shaft or pit sunk into the earth, sometimes in the vein, and sometimes not.

GROOVE, among joiners, the channel made by their plough in the edge of a moulding, stile, or rail, to introduce pannels in, in wainscoting.

GROSS, a foreign money, in some countries, answering to our groat.

Gross is used among us for the quantity of twelve dozen.

Gross *weight*, is the weight of merchandize and goods, with their dust and dross, as also of the bag, cask, chest, &c. wherein they are contained; out of which gross weight, allowance is to be made of tare and tret.

GROSS, or GROSSUS, in our ancient law writers, denote a thing absolute, and not depending on another. Thus, *villain in gross*, *villanus in grosso*, was a servant, who did not belong to the land, but immediately to the person of the lord; or a servile person not appendant or annexed to the land or manor, and to go along with the tenures as appurtenant to it; but like other personal goods and chattels of his lord, at his lord's pleasure and disposal.

Gross, *advowson in*. See ADVOWSON.

GROSS-BEAN, in zoology, a name by which we commonly call the *coccybraustes*, called also at other times the *harv-fuch*. This is the *LOXIA coccybraustes* in the Linnaean system.

GROSS-BEAK, in ornithology; a species of *LOXIA*.

GROSSULARIA. See RIBES.

GROTESQUE, in sculpture and painting, something whimsical, extravagant, and monstrous; consisting either of things that are merely imaginary, and have no existence in nature; or of things so distorted, as to raise surprise and ridicule. The name arises hence, that figures of this kind were anciently much used to adorn the *grottos*, wherein the tombs of eminent persons or families were inclosed. Such was that of Ovid, whose grotto was discovered near Rome about one hundred years ago.

GROTIUS (Hugo), or more properly HUGO DE GROOT, one of the greatest men in Europe, was born at Delft in 1583.

He made so rapid a progress in his studies, that at the age of 15 he had attained a great knowledge in philosophy, divinity, and civil law; and a yet greater proficiency in polite literature, as appeared by the commentary he had made at that age on Martianus Capella. In 1598, he accompanied the Dutch ambassador into France, and was honoured with several marks of esteem by Henry IV. He took his degree of doctor of laws in that kingdom; and at his return to his native country, devoted himself to the bar, and pleaded before he was 17 years of age. He was not 24 when he was appointed attorney-general. In 1613 he settled in Rotterdam, and was nominated syndic of that city; but did not accept of the office, till a promise was made him that he should not be removed from it. This prudent precaution he took from his foreseeing, that the quarrels of the divines on the doctrine of grace, which had already given rise to many factions in the state, would occasion revolutions in the chief cities. The same year he was sent into England, on account of the divisions that reigned between the traders of the two nations, on the right of fishing in the northern seas; but he could obtain no satisfaction. He was afterwards sent to England, as it is thought, to persuade the king and the principal divines to favour the Arminians; and he had several conferences with King James on that subject. On his return to Holland, his attachment to Barneveldt involved him in great trouble; for he was seized, and sentenced to perpetual imprisonment in 1619, and to forfeit all his goods and chattels. But after having been treated with great rigour for above a year and a half in his confinement, he was delivered by the advice and artifice of his wife, who having observed that his keepers had often fatigued themselves with searching and examining a great trunk-full of foul linen which used to be washed at Gorkum, but now let it pass without opening it, she advised him to bore holes in it to prevent his being stifled, and then to get into it. He complied with this advice, and was carried to a friend's house in Gorkum; where dressing himself like a mason, and taking a rule and trowel, he passed through the market-place, and stepping into a boat went to Velvet in Brabant. Here he made himself known to some Arminians, and hired a carriage to Antwerp. At first there was a design of prosecuting his wife, who staid in the prison; and some judges were of opinion that she ought to be kept there in her husband's stead: however, she was released by a plurality of voices, and universally applauded for her behaviour. He now retired into France, where he met with a gracious reception from that court, and Louis XIII. settled a pension upon him. Having resided there eleven years, he returned to Holland, on his receiving a very kind letter from Frederic Henry prince of Orange: but his enemies renewing their persecution, he went to Hamburg; where, in 1634, Queen Christina of Sweden made him her counsellor, and sent him ambassador into France. After having discharged the duties of this office above eleven years, he returned, in order to give an account to Queen Christina of his embassy: when he took Holland in his way, and received many honours at Amsterdam. He was introduced to her Swedish majesty at Stockholm, and there begged that she would grant his dismissal, in order that he might return to Holland. This he obtained with difficulty: and the queen gave him many marks of her esteem, though he had many enemies at this court. As he was returning, the ship in which he embarked was cast away on the coast of Pomerania: and being now sick, he continued his journey by land; but was forced to stop at Roslock, where he died, on the 28th of August 1645. His body was carried to Delft, to be interred in the sepulchre of his ancestors. Notwithstanding the embassies in which he was employed, he composed a great number of excellent works; the principal of which are, 1. A treatise *De jure belli et pacis*, which is esteemed a master-piece. 2. A treatise on the truth of the Christian

religion. 3. Commentaries on the holy scriptures. 4. The history and annals of Holland. 5. A great number of letters. All which are written in Latin.

GROTSKAW, a town of Turkey in Europe, in the province of Servia, where a battle was fought between the Germans and Turks in the year 1739, in which the Germans were forced to retreat with loss. E. long. 21. 0. N. lat. 45. 0.

GROTSKAW, a strong town of Germany, capital of a province of the same name in Silesia. It is very agreeably seated in a fruitful plain. E. long. 17. 35. N. lat. 50. 42.

GROTTO, or GROTTA, a large deep cavern or den in a mountain or rock. The word is Italian, *grotta*, formed, according to Menage, &c. from the Latin *crypta*. Du Cange observes, that *grotta* was used in the same sense in the corrupt Latin. The ancient anchorites retired into dens and grottos, to apply themselves the more attentively to meditation. *Okey-hole*, *Elden-hole*, *Peake's-hole*, and *Pool's-hole*, are famous among the natural caverns or grottos of our country. The entrance to Okey-hole, on the south side of Mendip-hills, is in the fall of those hills, which is beset all about with rocks, and has near it a precipitate descent of near twelve fathoms deep, at the bottom of which there continually issues from the rocks a considerable current of water. The naked rocks above the entrance show themselves about 30 fathoms high, and the whole ascent of the hill above is about a mile, and is very steep. As you pass into this vault, you go at first upon a level, but advancing farther, the way is found to be rocky and uneven, sometimes ascending, and sometimes descending. The roof of this cavern, in the highest part, is about eight fathoms from the ground, but in many particular places it is so low, that a man must stoop to get along. The breadth is not less various than the height, for in some places it is five or six fathoms wide, and in others not more than one or two. It extends itself in length about two hundred yards. People talk much of certain stones in it, resembling men and women, and other things; but there is little matter of curiosity in these, being only shapeless lumps of a common spar. At the farthest part of the cavern there is a good stream of water, large enough to drive a mill, which passes all along one side of the cavern, and at length slides down about six or eight fathoms among the rocks, and then pressing through the clefts of them, discharges itself into the valley. The river within the cavern is well stored with eels, and has some trouts in it; and these cannot have come from without, there being so great a fall near the entrance. In dry summers, a great number of frogs are seen all along this cavern, even to the farthest part of it; and on the roof of it, at certain places, hang vast numbers of bats, as they do in almost all caverns, the entrance of which is either level, or but slightly ascending or descending; and even in the more perpendicular ones they are sometimes found, provided they are not too narrow, and are sufficiently high. The cattle that feed in the pastures through which this river runs have been known to die suddenly sometimes after a flood; this is probably owing to the waters having been impregnated, either naturally or accidentally, with lead ore.

Elden-hole is a huge profound perpendicular chasm, three miles from Buxton, ranked among the natural wonders of the Peak. Its depth is unknown, and is pretended to be unfathomable. Cotton tells us he founded 884 yards; yet the plummet still drew. But he might easily be deceived, unless his plummet was very heavy; the weight of a rope of that length might well make the landing of the plummet scarce perceivable.

Peake's-hole, and *Pool's-hole*, called also *the Devil's A--se*, are two remarkable horizontal springs under mountains; the one near Castleton, the other just by Buxton. They seem to have owed their origin to the springs which have their current through them; when the water had forced its way through the

horizontal fissures of the strata, and had carried the loose earth away with it, the loose stones must fall down of course: and where the strata had few or no fissures, they remained entire; and so formed these very irregular arches, which are now so much wondered at. The water which passes through Pool's-hole is impregnated with particles of lime-stone, and has incruited the whole cavern in such a manner that it appears as one solid rock.

In grottos are frequently found crystals of the rock, stalactites, and other natural congelations, and those often of an amazing beauty. M. Homberg conjectures, from several circumstances, that the marble pillars in the grotto of Antiparos vegetate or grow. That author looks on this grotto as a garden, whereof the pieces of marble are the plants; and endeavours to show, that they could only be produced by some vegetative principle.

At Foligno in Italy is another grotto, consisting of pillars and orders of architecture of marble, with their ornaments, &c. scarcely inferior to those of art; but they all grow downwards: so that if this too be a garden, the plants are turned upside down.

GROTTO *del Cani*, a little cavern near Pozzuoli, four leagues from Naples, the steams whereof are of a mephitical or noxious quality; whence also it is called *bocca venenosa*, the poisonous mouth. See CHEMISTRY, p. 412. "Two miles from Naples (says Dr. Mead) just by the Lago de Agnano, is a celebrated mofeta, commonly called *la Grotta del Cani*, and equally destructive to all within the reach of its vapours. It is a small grotto about eight feet high, twelve long, and six broad; from the ground arises a thin, subtle, warm fume, visible enough to a discerning eye, which does not spring up in little parcels here and there, but in one continued stream, covering the whole surface of the bottom of the cave; having this remarkable difference from common vapours, that it does not, like smoke, disperse itself into the air, but quickly after its rise falls back again, and returns to the earth; the colour of the sides of the grotto being the measure of its ascent: for so far it is of a darkish-green, but higher only common earth. And as I myself found no inconvenience by standing in it, so no animal, if its head be above this mark, is the least injured. But when, as the manner is, a dog, or any other creature, is forcibly kept below it; or, by reason of its smallness, cannot hold its head above it, it presently loses all motion, falls down as dead, or in a swoon; the limbs convulsed and trembling, till at last no more signs of life appear than a very weak and almost insensible beating of the heart and arteries; which, if the animal be left a little longer, quickly ceases too, and then the case is irrecoverable; but if it be snatched out, and laid in the open air, it soon comes to life again, and sooner if thrown into the adjacent lake."

Respecting this steam, which, however, is nothing else than what is called *fixed air* (carbonic acid) issuing out of the earth in that place in very great quantity, from a cause not as yet known, see the articles BLOOD and DAMPS.

GROTTO *del Serpi*, is a subterraneous cavern near the village of Sassa, eight miles from the city of Bracciano in Italy, described by Kircher thus: "The *grotta del serpi* is big enough to hold two persons. It is perforated with several fistular apertures, somewhat in manner of a sieve; out of which, at the beginning of the spring season, issues a numerous brood of young snakes of divers colours, but all free from any particular poisonous quality. In this cave they expose their lepers, paralytics, arthritics, and elephantiac patients, quite naked; where, the warmth of the subterraneous steams resolving them into a sweat, and the serpents clinging variously all around, licking and sucking them, they become so thoroughly freed of all their vitious humours, that, upon repeating the operation for some time, they become perfectly restored." This cave Kircher visited himself; and found it warm, and every way agreeable to

the description given of it. He saw the holes, and heard a murmuring hissing noise in them. Though he missed seeing the serpents, it not being the season of their creeping out, yet he saw a great number of their exuviae, or sloughs, and an elin growing hard by laden with them. The discovery of this cave was by the cure of a leper going from Rome to some baths near this place. Losing his way, and being benighted, he happened upon this cave. Finding it very warm, he pulled off his clothes; and, being weary and sleepy, had the good fortune not to feel the serpents about him till they had wrought his cure.

MILKY GROTTO, *Crypta Lactea*, a mile distant from the ancient village of Bethlehem, is said to have been thus denominated on occasion of the blessed Virgin, who let fall some drops of milk in giving suck to Jesus in this grotto. And hence it has been commonly supposed, that the earth of this cavern has the virtue of restoring milk to women that are grown dry, and even of curing fevers. Accordingly, they are always digging in it, and the earth is sold at a good rate to such as have folly enough to give credit to the fable. An altar has been built on the place, and a church just by it.

GROTTO is also used for a little artificial edifice made in a garden, in imitation of a natural grotto. The outsides of these grottos are usually adorned with rustic architecture, and their inside with shell-work, fossils, &c. finished likewise with jets d'eau or fountains, &c. A cement for artificial grottos may be made thus: Take two parts of white rosin, melt it clear, and add to it four parts of bees' wax; when melted together, add two or three parts of the powder of the stone you design to cement, or so much as will give the cement the colour of the stone. With this cement, the stones, shells, &c. after being well dried before the fire, may be cemented. Artificial red coral branches, for the embellishment of grottos, may be made in the following manner: Take clear rosin, dissolve it in a brass-pan; to every ounce of which add two drams of the finest vermilion: when you have stirred them well together, and have chosen your twigs and branches, peeled and dried, take a pencil and paint the branches all over whilst the composition is warm; afterwards shape them in imitation of natural coral. This done, hold the branches over a gentle coal-fire, till all is smooth and even as if polished. In the same manner white coral may be prepared with white lead, and black coral with lamp-black. A grotto may be built, with little expence, of glass, cinders, pebbles, pieces of large flint, shells, moss, stones, counterfeit coral, pieces of chalk, &c. all bound or cemented together with the above described cement.

GROVE, in gardening, a small wood impervious to the rays of the sun. Groves have been in all ages held in great veneration. The *proseuchæ*, and high-places of the Jews, whither they resorted for the purposes of devotion, were probably situated in groves: See Joshua xxiv. 26. The *proseuchæ* in Alexandria, mentioned by Philo, had groves about them, because he complains that the Alexandrians, in a tumult against the Jews, cut down the trees of their *proseuchæ*. The ancient Romans had a sort of groves near several of their temples, which were consecrated to some god, and called *luci* by antiphrasis, a *non lucendo*, as being shady and dark. The veneration which the ancient druids had for groves is well known. Modern groves are not only great ornaments to gardens, but are also the greatest relief against the violent heats of the sun, affording shade to walk under in the hottest parts of the day, when the other parts of the gardens are exposed; so that every garden is defective which has not some such shade.

Groves are of two sorts, *viz.* either *open* or *close*. *Open* groves are such as have large shady trees, which stand at such distances, as that their branches approach so near to each other as to prevent the rays of the sun from penetrating through them. *Close* groves have frequently large trees standing in them; but

the ground under these is filled with shrubs or underwood: so that the walks which are in them are private, and screened from winds; by which means they are rendered agreeable for walking, at those times when the air is either too hot or too cold in the more exposed parts of the garden. These are often contrived so as to bound the open groves, and frequently to hide the walls or other inclosures of the garden: and when they are properly laid out, with dry walks winding through them, and on the sides of these sweet-smelling shrubs and flowers irregularly planted, they have a charming effect.

GROUND, in painting, the surface upon which the figures and other objects are represented. The ground is properly understood of such parts of the piece as have nothing painted on them, but retain the original colour upon which the other colours are applied to make the representations. A building is said to serve as a ground to a figure when the figure is painted on the building. The ground behind a picture in miniature is commonly blue or crimson, imitating a curtain of satin or velvet.

GROUND, in etching, denotes a composition of gums smeared over the surface of the metal to be etched, to prevent the aquafortis from eating, except in such places where this ground is cut through with the point of a needle. See the article **ETCHING**.

GROUND-Angling, fishing under water without a float, only with a plumb of lead, placed about nine inches from the hook; or a bullet, which is better, because it will roll on the ground. This method of fishing is most proper in cold weather, when the fish swim very low. The morning and evening are the proper times for the ground-line in fishing for trout: but if the day prove cloudy, or the water muddy, you may fish at ground all the day.

GROUND-Tackle, a ship's anchors, cables, &c. and in general whatever is necessary to make her ride safe at anchor.

GROUND-Ivy, in botany. See **GLECHOMA**.

GROUND-Pine, in botany. See **TEUCRIUM**.

GROUNDSEL. See **SENECIO**.

GROUP, in painting and sculpture, is an assemblage of two or more figures of men, beasts, fruits, or the like, which have some apparent relation to each other. See **PAINTING**. The word is formed of the Italian *gruppo*, a *knot*.

The Groups, a cluster of islands lately discovered in the South Sea. They lie in about S. lat. 18. 12. and W. lon. 142. 42. They are long narrow slips of land, ranging in all directions, some of them ten miles or upwards in length, but not more than a quarter of a mile broad. They abound in trees, particularly those of the cocoa-nut. They are inhabited by well-made people, of a brown complexion. Most of them carried in their hands a slender pole about 14 feet in length, pointed like a spear; they had likewise something shaped like a paddle, about four feet long. Their canoes were of different sizes, carrying from three to six or seven people, and some of them hoisted a sail.

GROUSE, or **GROUSE**. See **TETRAO**.

GROUTHEAD, or **GREATHED** (Robert), a learned and famous bishop of Lincoln, was born at Stow in Lincolnshire, or (according to others) at Stradbroke in Suffolk, in the latter part of the twelfth century. His parents were so poor, that when a boy he was reduced to do the meanest offices, and even to beg his bread; till the mayor of Lincoln, struck with his appearance and the quickness of his answers to certain questions, took him into his family, and put him to school. Here his ardent love of learning, and admirable capacity for acquiring it, soon appeared, and procured him many patrons, by whose assistance he was enabled to prosecute his studies, first at Cambridge, afterwards at Oxford, and at last at Paris. In these three famous seats of learning, he spent many years in the most indefatigable

pursuit of knowledge, and became one of the best and most universal scholars of the age. He was a great master not only of the French and Latin, but also of the Greek and Hebrew languages, which was a rare accomplishment in those times. We are assured by Roger Bacon, who was intimately acquainted with him, that he spent much of his time for almost forty years in the study of geometry, astronomy, optics, and other branches of mathematical learning, in all which he very much excelled. Theology was his favourite study, in which he read lectures at Oxford with great applause. In the mean time he obtained several preferments in the church, and was at length elected and consecrated bishop of Lincoln, A. D. 1235. This most excellent and learned prelate was a very voluminous writer, and composed a prodigious number of treatises on a great variety of subjects in philosophy and divinity, a catalogue of which is given by Bale.

GROWTH, the gradual increase of bulk and stature that takes place in animals or vegetables, to a certain period. The increase of bulk in such bodies as have no life, owing to fermentations excited in their substance, or to other causes, is called **EXPANSION**, **SWELLING**, &c. The growth of animals, nay even of the human species, is subject to great variations. A remarkable instance in the last was observed in France in the year 1729. At this time the Academy of Sciences examined a boy, who was then only seven years old, and who measured four feet eight inches and four lines high without his shoes. His mother observed the signs of puberty in him at two years old, which continued to increase very quick, and soon arrived at the usual standard. At four years old he was able to lift and toss the common bundles of hay in stables into the horses' racks; and at six years old could lift as much as a sturdy fellow of twenty. But though he thus increased in bodily strength, his understanding was no greater than is usual with children of his age, and their playthings were also his favourite amusements.

Another boy, a native of the hamlet of Bouzanquet, in the diocese of Alais, though of a strong constitution, appeared to be knit and stiff in his joints till he was about four years and a half old. During this time nothing farther was remarkable of him than an extraordinary appetite, which was satisfied no otherwise than by giving him plenty of the common aliments of the inhabitants of the country, consisting of rye-bread, chefnuts, bacon, and water; but his limbs soon becoming supple and pliable, and his body beginning to expand itself, he grew up in so extraordinary a manner, that at the age of five years he measured four feet three inches; some months after he was four feet eleven inches; and at six, five feet, and bulky in proportion. His growth was so rapid, that one might fancy he saw him grow: every month his clothes required to be made longer and wider; and what was still very extraordinary in his growth, it was not preceded by any sickness, nor accompanied with any pain in any part of his body. At the age of five years his voice changed, his beard began to appear, and at six he had as much as a man of thirty: in short, all the unquestionable marks of puberty were visible in him. It was not doubted in the country but this child was, at five years old, or five and a half, in a condition of begetting other children; which induced the rector of the parish to recommend to his mother that she would keep him from too familiar a conversation with children of the other sex. Though his wit was riper than is commonly observable at the age of five or six years, yet its progress was not in proportion to that of his body. His air and manner still retained something childish, though by his bulk and stature he resembled a complete man, which at first sight produced a very singular contrast. His voice was strong and manly, and his great strength rendered him already fit for the labours of the country. At the age of five years, he could carry to a good distance three measures of rye, weighing 84 pounds; when turned

of six, he could lift up easily on his shoulders and carry loads of 150 pounds weight a good way off: and these exercises were exhibited by him as often as the curious engaged him thereto by a reward. Such beginnings made people think that he would shoot up into a giant. A mountebank was already soliciting his parents for him, and flattering them with hopes of putting him in a way of making a great fortune. But all these hopes suddenly vanished. His legs became crooked, his body shrunk, his strength diminished, his voice grew sensibly weaker, and he at last sunk into a total imbecility.

In the Paris Memoirs also there is an account of a girl who had her menses at the age of three months. When four years old, she was four feet six inches in height, and had her limbs well proportioned to that height, her breasts large and plump, and the parts of generation like those of a girl of eighteen; so that there is no doubt but that she was marriageable at that time, and capable of being a mother of children. These things are more singular and marvellous in the northern than in the southern climates, where the females come sooner to maturity. In some places of the East Indies, the girls, it is said, have children at nine years of age.

Many other instances of extraordinary growth might be brought, but the particulars are not remarkably different from those already related. It is at first sight astonishing that children of such early and prodigious growth do not become giants: but when we consider, that the signs of puberty appear so much sooner than they ought, it seems evident that the whole is only a more than usually rapid expansion of the parts, as in hot climates; and accordingly it is observed, that such children, instead of becoming giants, always decay and die, apparently of old age, long before the natural term of human life.

GRUB, in zoology, the English name of the hexapode worms, produced from the eggs of beetles, and which at length are transformed into winged insects of the same species with their parents.

GRUBBING, in agriculture, the digging or pulling up of the stumps and roots of trees. When the roots are large, this is a very troublesome and laborious task; but Mr. Mortimer has shown how it may be accomplished in such a manner, as to save great expence by a very simple and easy method. He proposes a strong iron hook to be made, about two feet four inches long, with a large iron-ring fastened to the upper part of it. This hook must be put into a hole in the side of the root, to which it must be fastened; and a lever being put into the ring, three men, by means of this lever, may draw out the root, and twist the sap-roots asunder. Stubs of trees may also be taken up with the same hook, in which work it will save a great deal of labour, though not so much as in the other; because the stumps must be first cleft with wedges, before the hook can enter the sides of them, to wrench them out by pieces.

GRUBENHAGEN, a town and castle of Germany, in the circle of Lower Saxony, and the chief place of a principality of the same name, belonging to the house of Hanover. In the mountains near it are mines of silver, iron, copper, and lead. These mountains are covered with trees, some remains of the Hercynian forest. It is 45 miles S. of Hanover. E. lon. 10. 3. N. lat. 51. 31.

GRUINALES, from *grus* "a crane," the name of the fourteenth order in Linnæus's Fragments of a Natural Method, consisting of *geranium*, and a few other genera which the author considers as allied to it in their habit and external structure. See BOTANY, page 50.

GRUPPO, or Turned SHAKE, a musical grace, defined by Playford to consist in the alternate prolation of two tones in juxtaposition to each other, with a close on the note immediately beneath the lower of them. See SHAKE.

GRUS, in antiquity, a dance performed yearly by the young

Athenians around the temple of Apollo, on the day of the *Deilia*. The motions and figures of this dance were very intricate, and variously interwoven; some of them being intended to express the windings of the labyrinth wherein the minotaur was killed by Theseus.

GRUS, in astronomy, a southern constellation, not visible in our latitude. The number of stars in this constellation, according to Mr. Sharp's Catalogue, is 13.

GRUS, in ornithology. See ARDEA.

GRUTER (James), a learned philologist, and one of the most laborious writers of his time, was born at Antwerp in 1560. He was but a child when his father and mother, being persecuted for the Protestant religion by the dukes of Parma, governors of the Netherlands, carried him into England. He imbibed the elements of learning from his mother, who was one of the most learned women of the age, and besides French, Italian, and English, was a complete mistress of Latin, and well skilled in Greek. He spent some years in the university of Cambridge; after which he went to that of Leyden to study the civil law; but at last applied himself wholly to polite literature. After travelling much, he became professor in the university of Heidelberg; near which city he died in 1627. He wrote many works, the most considerable of which are, 1. A large collection of ancient inscriptions. 2. *Thesaurus criticus*. 3. *Delicæ prætorum Gallorum, Italorum, & Belgarum, &c.*

GRUYÈRES, a town of Switzerland, in the canton of Friburg, with a handsome castle, where the bailiff resides. It is famous for cheese, and is 15 miles S. W. of Friburg. A dangerous insurrection broke out here in 1781, which threatened the destruction even of Friburg, the capital, but was happily quelled by some troops from Bern. W. lon. 6. 43. N. lat. 46. 35.

GRY, a measure containing one-tenth of a line. A line is one-tenth of a digit, and a digit one-tenth of a foot, and a philosophical foot one-third of a pendulum, whose diadromes, or vibrations, in the latitude of 45 degrees, are each equal to one-second of time, or one-sixtieth of a minute.

GRYLLUS, in zoology, the name of the cricket and locust kinds, which, together with the grasshoppers, make only one genus of insects, belonging to the order of *hemiptera*. See plate 2. The general characters of the genus are these: The head is inflexed, armed with jaws, and furnished with palpi: The antennæ in some of the species are setaceous, in others filiform: The wings are deflected towards and wrapped round the sides of the body; the under ones are folded up, so as to be concealed under the elytra. All the feet are armed with two nails; and the hind ones are formed for leaping. The genus is subdivided into five different sections, or families:

I. The ACRIDÆ, *Truxalides* of Fabricius, or CRICKET family properly so called; of which the characters are: The head is of a conical form, and longer than the thorax; and the antennæ are ensiform, or sword-shaped. Of this family there are eight species, none of them found in Britain.

II. The BULLÆ, or *Aerydia* of Fabricius: These are distinguished by a kind of crest or elevation on the thorax; their antennæ are shorter than the thorax, and filiform; and their palpi are equal. The gryllus *bulle-lipunctatus* is of a dark brown colour; sometimes besprinkled with spots of a lighter hue. But the chief and most obvious distinction of this species is the form of its thorax, which is prolonged, covering the whole body, and decreases to the extremity of the abdomen. This prolongation of the thorax stands instead of elytra, of which this insect is destitute. It has only wings under this projection of the thorax. Linnæus mentions a spot in the thorax; which, however, is often wanting. This species is every where to be met with, in the fields, in woods, &c. There are 10 or 11 other species, inhabitants of Europe and America.

III. The third family, called *ACHETÆ*, are distinguished by two bristles, situated above the extremity of their abdomen, by having three stemmata, and by the tarsi being composed of three articulations. This family is in many places called *Cricket*, on account of the sound which the insect makes. There are 28 species enumerated in the new edition of the *Systema Naturæ*; of which the most remarkable are,

1. The *gryllus domesticus*, or the *domesticus* and *campestris*, the domestic and the field gryllus being one and the same species; only that the former is paler and has more of the yellow cast, and the latter more of a brown. The antennæ are as slender as a thread, and nearly equal to the body in length. The head is large and round, with two large eyes, and three smaller ones of a light yellow colour, placed higher on the edge of the depression, from the centre of which originate the antennæ: The thorax is broad and short. In the *males*, the elytra are longer than the body, veined, as it were rumpled on the upper part, crossed one over the other, and enfolding part of the abdomen, with a projecting angle on the sides: They have also at their base a pale-coloured band. In the *females*, the elytra leave one-third of the abdomen uncovered, and scarcely cross each other; and they are all over of one colour, veined and not rumpled; nor do they wrap round so much of the abdomen underneath. The female, moreover, carries at the extremity of its body a hard spine, almost as long as the abdomen, thicker at the end, composed of two sheaths, which encompass two laminæ: This implement serves the insect to sink and deposit its eggs in the ground. Both the male and female have two pointed soft appendices at the extremity of the abdomen. Their hinder feet are much larger and longer than the rest, and serve them for leaping.

Towards sunset is the time the *field gryllus*, or *cricket*, as it is often called, likes best to appear out of its subterraneous habitation. In White's *Natural History of Selbourne*, Let. 46. a very pleasing account is given of the manners and economy of these insects; which, however, are so shy and cautious, he observes, that it is no easy matter to get a sight of them; for, feeling a person's footsteps as he advances, they stop short in the midst of their song, and retire backward nimbly into their burrows, where they lurk till all suspicion of danger is over. At first it was attempted to dig them out with a spade, but without any great success; for either the bottom of the hole was inaccessible from its terminating under a great stone; or else, in breaking up the ground, the poor insect was inadvertently squeezed to death. Out of one so bruised a multitude of eggs were taken, which were long and narrow, of a yellow colour, and covered with a very tough skin. More gentle means were then used, and proved successful: "a pliant stalk of grass, gently insinuated into the caverns, will probe their windings to the bottom, and quickly bring out the inhabitant; and thus the humane enquirer may gratify his curiosity without injuring the object of it. It is remarkable, that though these insects are furnished with long legs behind, and brawny thighs for leaping, like grasshoppers, yet when driven from their holes they show no activity, but crawl along in a shiftless manner, so as easily to be taken: and again, though provided with a curious apparatus of wings, yet they never exert them when there seems to be the greatest occasion. The males only make that shrilling noise perhaps out of rivalry and emulation, as is the case with many animals which exert some sprightly note during their breeding time: it is raised by a brisk friction of one wing against the other. They are solitary beings, living singly male or female, each as it may happen; but there must be a time when the sexes have some intercourse, and then the wings may be useful perhaps during the hours of night. When the males meet they will fight fiercely, as our author found by some which he put into the crevices of a dry stone-wall, where he wanted to have made them settle. For though they seemed distressed by being taken

out of their knowledge, yet the first that got possession of the chinks would seize on any that were obtruded upon them with a vast row of serrated fangs. With their strong jaws, toothed like the shears of a lobster's claws, they perforate and round their curious regular cells, having no fore-claws to dig, like the mole-cricket. When taken in the hand, they never offered to defend themselves, though armed with such formidable weapons. Of such herbs as grow before the mouths of their burrows they eat indiscriminately; and on a little platform, which they make just by, they drop their dung; and never, in the daytime, seem to stir more than two or three inches from home. Sitting in the entrance of their caverns they chirp all night as well as day, from the middle of the month of May to the middle of July; in hot weather, when they are most vigorous, they make the hills echo; and in the stiller hours of darkness may be heard to a considerable distance. In the beginning of the season their notes are more faint and inward; but become louder as the summer advances, and so die away again by degrees. In March the crickets appear at the mouth of their cells, which they then open and bore, and shape very elegantly. All that ever I have seen at that season were in their pupa state, and had only the rudiments of wings, lying under a skin or coat, which must be cast before the insect can arrive at its perfect state; from whence I should suppose that the old ones of last year do not always survive the winter. In August their holes begin to be obliterated, and the insects are seen no more till spring.—Not many summers ago I endeavoured to transplant a colony to the terrace in my garden, by boring deep holes in the sloping turf. The new inhabitants staid some time, and fed and sung; but wandered away by degrees, and were heard at a farther distance every morning; so that it appears that on this emergency they made use of their wings in attempting to return to the spot from which they were taken. One of these crickets, when confined in a paper cage and set in the sun, and supplied with plants moistened with water, will feed and thrive, and become so merry and loud as to be irksome in the same room where a person is sitting: if the plants are not wetted, it will die."

The *domestic gryllus*, or hearth-cricket, as it is called, does not require to be sought after for examination, nor is shy like the other sort: it relides altogether within our dwellings, intruding itself upon our notice whether we will or no. It delights in new-built houses; being, like the spider, pleased with the moisture of the walls; and besides, the softness of the mortar enables them to burrow and mine between the joints of the bricks or stones, and to open communications from one room to another. They are particularly fond of kitchens and bakers' ovens, on account of their perpetual warmth. "Tender insects that live abroad either enjoy only the short period of one summer, or else doze away the cold uncomfortable months in profound slumbers; but these (our author observes), residing as it were in a torrid zone, are always alert and merry: a good Christmas fire is to them like the heats of the dog-days. Though they are frequently heard by day, yet is their natural time of motion only in the night. As soon as it grows dusk, the chirping increases, and they come running forth, and are from the size of a flea to that of their full stature. As one should suppose, from the burning atmosphere which they inhabit, they are a thirsty race, and show a great propensity for liquids, being found frequently drowned in pans of water, milk, broth, or the like. Whatever is moist they affect: and therefore often gnaw holes in wet woollen stockings and aprons that are hung to the fire. These crickets are not only very thirsty, but very voracious; for they will eat the scummings of pots: yeast, salt, and crumbs of bread; and any kitchen offal or sweepings. In the summer we have observed them to fly, when it became dusk, out of the windows, and over the neighbouring roofs. This feat of activity accounts for the sudden manner in which

they often leave their haunts, as it does for the method by which they come to houses where they were not known before. It is remarkable, that many sorts of insects seem never to use their wings but when they have a mind to shift their quarters and settle new colonies. When in the air they move "*volatu undoso*," in waves or curves, like wood peckers, opening and shutting their wings at every stroke, and so are always rising or sinking. When they increase to a great degree, as they did once in the house where I am now writing, they become noisome pests, flying into the candles, and dashing into people's faces; but may be blasted by gunpowder discharged into their crevices and crannies. In families, at such times, they are like Pharaoh's plague of frogs,—'in their bedchambers, and upon their beds, and in their ovens, and in their kneading troughs.' Their shrilling noise is occasioned by a brisk attrition of their wings. Cats catch hearth-crickets, and, playing with them as they do with mice, devour them. Crickets may be destroyed, like wasps, by phials half filled with beer, or any liquid, and set in their haunts; for, being always eager to drink, they will crowd in till the bottles are full." A popular prejudice, however, frequently prevents their being driven away and destroyed: the common people imagine that their presence brings a kind of luck to the house while they are in it, and think it would be hazardous to destroy them.

2. *Gryllus gryllotalpa*, or mole cricket, is of a very unpleasant form. Its head, in proportion to the size of its body, is small and oblong, with four long thick palpi, and two long antennæ as slender as threads. Behind the antennæ are situated the eyes, and between those two eyes are seen three stemmata or lesser eyes, amounting to five in all, set in one line transversely. The thorax forms a kind of cuirass, oblong, almost cylindrical, which appears as it were velvety. The elytra, which are short, reach but to the middle of the abdomen, are crossed one over the other, and have large black or brown nervous fibres. The wings terminate in a point, longer not only than the elytra, but even than the abdomen. This latter is soft, and ends in two points or appendices of some length. But what constitutes the chief singularity of this insect are its fore-feet, that are very large and flat, with broad legs, ending outwardly in four large ferrated claws, and inwardly in two only; between which claws is situated, and often concealed, the tarsus. The whole animal is of a brown dusky colour. It haunts moist meadows, and frequents the sides of ponds and banks of streams, performing all its functions in a swampy wet soil. With a pair of fore-feet, curiously adapted to the purpose, it burrows and works under ground like the mole, raising a ridge as it proceeds, but seldom throwing up hillocks. As mole-crickets often infest gardens by the sides of canals, they are unwelcome guests to the gardener, raising up ridges in their subterraneous progress, and rendering the walks unsightly. If they take to the kitchen gardens, they occasion great damage among the plants and roots, by destroying whole beds of cabbages, young legumes, and flowers. When dug out they seem very slow and helpless, and make no use of their wings by day; but at night they come abroad, and make long excursions. In fine weather, about the middle of April, and just at the close of day, they begin to solace themselves with a low, dull, jarring note, continued for a long time without interruption, and not unlike the chattering of the fern-owl, or goat-sucker, but more inward. About the beginning of May they lay their eggs, as Mr. White informs us, who was once an eye-witness: "for a gardener at an house where he was on a visit, happening to be mowing, on the 6th of that month, by the side of a canal, his scythe struck too deep, pared off a large piece of turf, and laid open to view a curious scene of domestic economy. There were many caverns and winding passages leading to a kind of chaniber, neatly smoothed and rounded, and about the size of a moderate snuff-

box. Within this secret nursery were deposited near 100 eggs of a dirty yellow colour, and enveloped in a tough skin, but too lately excluded to contain any rudiments of young, being full of a viscous substance. The eggs lay but shallow, and within the influence of the sun, just under a little heap of fresh-mowed mould, like that which is raised by ants.—When mole-crickets fly, they move "*curfu undoso*," rising and falling in curves, like the domestic species mentioned before. In different parts of this kingdom people call them *fen-crickets*, *churr-worms*, and *eve-churrs*, all very apposite names."

IV. The TETTIGONIÆ, GRASSHOPPERS, or *Locusts* armed at the tail: The females of this family are distinguished by a tubular dart at the extremity of their abdomen: in both sexes the antennæ are setaceous, and longer than the abdomen; and the tarsi composed of four articulations. Of these insects there are 69 species enumerated in the *Systema Naturæ*. They leap by the help of their hinder legs, which are strong and much longer than the fore ones. Their walk is heavy, but they fly tolerably well. Their females deposit their eggs in the ground, by means of the appendices which they carry in their tail, which consist of two laminae, and penetrate the ground. They lay a great number of eggs at a time; and those eggs, united in a thin membrane, form a kind of group. The little larvæ that spring from them are wholly like the perfect insects, excepting in size, and their having neither wings nor elytra, but only a kind of knobs, four in number, which contain both, but undisplayed. The unfolding of them only takes place at the time of the metamorphosis, when the insect has attained its full growth. In these insects, when examined internally, besides the gullet, we discover a small stomach; and behind that, a very large one, wrinkled and furrowed within-side. Lower down, there is still a third: so that it is thought, and with some probability, that all the animals of this genus chew the cud, as they so much resemble ruminant animals in their internal conformation.

V. LOCUSTÆ (the *Grylli* of Fabricius), or *Locusts* unarmed at the tail. This family is distinguished by having the tail purple, without the setæ of the *Achetæ*, or the tube of the *Tettigoniæ*: their antennæ are filiform, and half shorter than the abdomen: they have three stemmata, and three joints to the tarsi. To part of this description, however, there is an exception in the *gryllus locusta-grossus*, the antennæ of which are of a cylindrical form. According to Mr. Barbutt, "few species vary so much in size and colours. Some of these insects are twice as long as others; the antennæ in most are filiform, but in this particular species cylindrical, composed of about 24 articulations, and but one-fourth of the length of the body. As to colour, the small individuals are nearly quite red spotted with black, with the under part of the body only of a greenish yellow. The larger subjects are all over of a greenish hue, the under part being of a deeper yellow, only the inside of the hinder thighs is red. But what characterises this species is, the form of the thorax, which has, above, a longitudinal elevation, attended by one on each side, the middle whereof drawing nigh to the first, forms a kind of X. Moreover, between the claws that terminate the feet there are small sponges, but larger in this species than the rest. This species is to be met with every where in the country. The larvæ or caterpillars very much resemble the perfect insects, and commonly dwell under ground." Of this tribe, 118 other species are enumerated in the *Systema Naturæ*, natives of different parts of the globe; besides a considerable number noted as unascertained, with regard to their being distinct species, or only synonymous, or varieties of some of the others.

All the GRYLLI, except the first family which feed upon other insects, live upon plants; the *achetæ* chiefly upon the roots, the *tettigoniæ* and *locustæ* upon the leaves.

The distinction of *Locusts* into families (IV. V.), as above

characterised, is extremely proper; and the difference of organisation upon which it is founded has been observed to be adapted to the mode and the places in which the insects lay their eggs. But by taking the wings into consideration, there might have been formed three tribes or divisions, instead of two, upon the same natural foundation. Thus, according to the observations of the Abbé Pouet in the *Journ. de Physique* for 1787, those which have their abdomen furnished with the tube or dart above mentioned, lay their eggs in a stiff sort of earth which that instrument perforates. During the operation, the dart opens; and, being hollow and grooved on each side within, the egg slides down along the grooves, and is deposited in the hole. Of those which have the tail simple, i. e. which have *no dart*, some have long wings, and some very short. The long-winged sort lay their eggs on the bare ground, and have no use for a perforating instrument; but they cover them with a glutinous substance, which fixes them to the soil, and prevents their being injured either by wind or wetness. Those again which have short wings deposit their eggs in the sand; and, to make the holes for this purpose, they have the power of elongating and retracting their abdominal rings, and can turn their body as on a pivot; in which operation long wings would have been a material impediment.

The annals of most of the warm countries are filled with accounts of the devastations produced by locusts, who sometimes make their appearance in clouds of vast extent. They seldom visit Europe in such swarms as formerly; yet in the warmer parts of it are still formidable. Those which have at uncertain intervals visited Europe in our memory, are supposed to have come from Africa: they are a large species about three inches long. The head and horns are of a brownish colour; it is blue about the mouth, as also on the inside of the larger legs. The shield which covers the back is greenish; and the upper side of the body brown, spotted black, and the under side purple. The upper wings are brown, with small dusky spots, and one larger spot at the tips. The under wings are more transparent, and of a light brown tinged with green, but there is a dark cloud of spots near the tips. These insects are bred in the warm parts of Asia and Africa, from whence they have often taken their flight into Europe, where they committed terrible devastations. They multiply faster than any other animal in the creation, and are truly terrible in the countries where they breed. Some of them were seen in different parts of Britain in the year 1748, and great mischiefs were apprehended: but happily for us, the coldness of our climate, and the humidity of our soil, are very unfavourable to their production; so that, as they are only animals of a year's continuance, they all perish without leaving a young generation to succeed them.

When the locusts take the field, it is said they have a leader at their head, whose flight they observe, and pay a strict regard to all his motions. They appear at a distance like a black cloud, which, as it approaches, gathers upon the horizon, and almost hides the light of day. It often happens, that the husbandman sees this imminent calamity pass away without doing him any mischief; and the whole swarm proceeds onward to settle upon some less fortunate country. In those places, however, where they alight, they destroy every green thing, stripping the trees of their leaves, as well as devouring the corn and grass. In the tropical climates they are not so pernicious as in the more southern parts of Europe. In the first, the power of vegetation is so strong, that an interval of three or four days repairs the damage; but in Europe this cannot be done till next year. Besides, in their long flights to this part of the world, they are fatigued by the length of their journey, and are therefore more voracious wherever they happen to settle. But as much damage is occasioned by what they destroy, as by what they devour. Their bite is thought to contaminate the plant, and either to

destroy or greatly to weaken its vegetation. To use the expression of the husbandmen, they burn wherever they touch, and leave the marks of their devastation for three or four years ensuing. When dead, they infect the air in such a manner that the stench is unsupportable. Orosius tells us, that in the year of the world 3800, Africa was infested with a multitude of locusts. After having eaten up every thing that was green, they flew off and were drowned in the sea; where they caused such a stench as could not have been equalled by the putrefying carcases of 100,000 men.

In the year 1650 a cloud of locusts were seen to enter Russia in three different places; and from thence they spread themselves over Poland and Lithuania in such astonishing multitudes, that the air was darkened and the earth covered with their numbers. In some places they were seen lying dead, heaped upon each other to the depth of four feet; in others, they covered the surface like a black cloth; the trees bent with their weight, and the damage which the country sustained exceeded computation.

In Barbary, their numbers are formidable; and Dr. Shaw was a witness of their devastations there in 1724. Their first appearance was in the latter end of March, when the wind had been southerly for some time. In the beginning of April, their numbers were so vastly increased, that, in the heat of the day, they formed themselves into large swarms that appeared like clouds, and darkened the sun. In the middle of May they began to disappear, retiring into the plains to deposit their eggs. In June the young brood began to make their appearance, forming many compact bodies of several hundred yards square; which afterwards marching forward, climbed the trees, walls, and houses, eating every thing that was green in their way. The inhabitants, to stop their progress, laid trenches all over their fields and gardens, which they filled with water. Some placed large quantities of heath, stubble, and such-like combustible matter, in rows, and set them on fire on the approach of the locusts. But all this was to no purpose; for the trenches were quickly filled up, and the fires put out by the great numbers of swarms that succeeded each other. A day or two after one of these was in motion, others that were just hatched came to glean after them, gnawing off the young branches, and the very bark of the trees. Having lived near a month in this manner, they arrived at their full growth, and threw off their worm-like state, by casting their skins. To prepare themselves for this change, they fixed their hinder part to some bush or twig, or corner of a stone, when immediately, by an undulating motion used on this occasion, their heads would first appear, and soon after the rest of their bodies. The whole transformation was performed in seven or eight minutes time, after which they remained for a little while in a languishing condition; but as soon as the sun and air had hardened their wings, and dried up the moisture that remained after casting off their former sloughs, they returned to their former greediness, with an addition both of strength and agility. But they did not long continue in this state before they were entirely dispersed. After laying their eggs, they directed their course northward, and probably perished in the sea. In that country, however, the amazing fertility of the soil and warmth of the climate generally render the depredations of these insects of little consequence; besides that many circumstances concur to diminish their number. Though naturally herbivorous, they often fight with each other, and the victor devours the vanquished. They are the prey, too, of serpents, lizards, frogs, and the carnivorous birds. They have been found in the stomachs of the eagle and different kinds of owls. They are also used as food by the Moors; who go to hunt them, fry them in oil or butter, and sell them publicly at Tunis and other places.

In 1754, 1755, 1756, and 1757, great devastations were

committed in Spain by a species of locusts, of which we have the following description by Don Guillerino Bowles, published in *Dillon's Travels* through that country. "The locusts are continually seen in the southern parts of Spain, particularly in the pastures and remote uncultivated districts of Estremadura, but in general are not taken notice of, if not very numerous, as they commonly feed upon wild herbs, without preying upon gardens and cultivated lands, or making their way into houses. The peasants look at them with indifference while they are frisking about in the field, neglecting any measure to destroy them till the danger is immediate and the favourable moment to remedy the evil is elapsed. Their yearly number is not very considerable, as the males are far more numerous than the females. If an equal proportion were allowed only for ten years, their numbers would be so great as to destroy the whole vegetative system. Beasts and birds would starve for want of subsistence, and even mankind would become a prey to their ravenous appetites. In 1754 their increase was so great from the multitude of females, that all La Mancha and Portugal were covered with them and totally ravaged. The horrors of famine were spread even farther, and assailed the fruitful provinces of Andalusia, Murcia, and Valencia.

"The amours of these creatures are objects of surprise and astonishment, and their union is such that it is difficult to separate them. When this separation is voluntary, after having lasted some hours, they are so exhausted, that the male retires immediately to the water for refreshment, where, losing the use of his limbs, he soon perishes, and becomes an easy prey to the fish: having given life to his offspring at the expence of his own. The female, disembarrassed, though not without violent struggles, spends the remainder of her days in some solitary place, busy in forming a retreat under ground, where she can secure her eggs, of which she generally lays about 40, screening them by her sagacity from the intemperance of the air, as well as the more immediate danger of the plough or the spade, one fatal blow of which would destroy all the hopes of a rising generation.

"The manner of her building this cell is equally surprising. In the hinder part of her body, nature has provided her with a round smooth instrument, eight lines in length, which at its head is as big as a writing quill, diminishing to a hard sharp point, hollow within like the tooth of a viper, but only to be seen with a lens. At the root of this vehicle there is a cavity, with a kind of bladder, containing a glutinous matter, of the same colour, but without the consistency or tenacity of that of the silk-worm, as I found by an experiment, made for the purpose, by an infusion in vinegar, for several days, without any effect. The orifice of the bladder corresponds exactly with the instrument which serves to eject the glutinous matter. It is hid under the skin of the belly, and its interior surface is united to the moveable parts of the belly, and can partake of its motions, forming the most admirable contexture for every part of its operations, as she can dispose of this ingredient at pleasure, and eject the fluid, which has three very essential properties: first, being indissoluble in water, it prevents the young from being drowned; next, it resists the heat of the sun, otherwise the structure would give way and destroy its inhabitants; lastly, it is proof against the frost of winter, so as to preserve a necessary warmth within. For greater security, this retreat is always contrived in a solitary place: for though a million of locusts were to light upon a cultivated field, not one would deposit her eggs there; but wherever they meet a barren and lone some situation, there they are sure to repair and lay their eggs.

"These locusts seem to devour, not so much from a ravenous appetite, as from a rage of destroying every thing that comes in their way. It is not surprising, that they should be fond of the most juicy plants and fruits, such as melons, and all man-

ner of garden fruits and herbs, and feed also upon aromatic plants, such as lavender, thyme, rosemary, &c. which are so common in Spain, that they serve to heat ovens: but it is very singular, that they equally eat mustard seed, onions, and garlic; nay even hemlock, and the most rank and poisonous plants, such as the thorn apple and deadly night-shade. They will even prey upon crowfoot, whose causticity burns the very hides of beasts; and such is their universal taste, that they do not prefer the innocent mallow to the bitter furze, or rue to wormwood, consuming all alike, without predilection or favour, with this remarkable circumstance, that during the four years they committed such havoc in Estremadura, the love-apple, or *Lycopersicon solanum* of Linnæus, was the only plant that escaped their rapacious tooth, and claimed a respect to its root, leaves, flowers, and fruit. Naturalists may search for their motives, which I am at a loss to discover; the more as I saw millions of them light on a field near Almaden, and devour the woollen and linen garments of the peasants, which were lying to dry on the ground. The curate of the village, a man of veracity, at whose house I was, assured me, that a tremendous body of them entered the church, and devoured the silk garments that adorned the images of the saints, not sparing even the varnish on the altars. The better to discover the nature of such a phenomenon, I examined the stomach of the locust, but only found one thin and soft membrane, with which, and the liquor it contains, it destroys and dissolves all kinds of substances, equally with the most caustic and venomous plants; extracting from them a sufficient and salutary nourishment.

"Out of curiosity to know the nature of so formidable a creature, I was urged to examine all its parts with the utmost exactness: its head is of the size of a pea, though longer; its forehead pointing downwards like the handsome Andalusian horse, its mouth large and open, its eyes black and rolling, added to a timid aspect not unlike a hare. With such a dastardly countenance who would imagine this creature to be the scourge of mankind! In its two jaws it has four incisive teeth, whose sharp points traverse each other like scissors, their mechanism being such as to gripe or to cut. Thus armed, what can resist a legion of such enemies? After devouring the vegetable kingdom, were they, in proportion to their strength and numbers, to become carnivorous like wasps, they would be able to destroy whole flocks of sheep, even to the dogs and shepherds; just as we are told of ants in America, that will overcome the fiercest serpents.

"The locust spends the months of April, May, and June, in the place of its birth: at the end of June its wings have a fine rose colour, and its body is strong. Being then in their prime, they assemble for the last time, and burn with a desire to propagate their species: this is observed by their motions, which are unequal in the two sexes. The male is restless and solicitous, the female is coy, and eager after food, flying the approaches of the male, so that the morning is spent in the courtship of the one and the retreat of the other. About ten o'clock, when the warmth of the sun has cleared their wings from the dampness of the night, the females seem uneasy at the forwardness of the males, who continuing their pursuit, they rise together 500 feet high, forming a black cloud that darkens the rays of the sun. The clear atmosphere of Spain becomes gloomy, and the finest summer day of Estremadura more dismal than the winter of Holland. The rustling of so many millions of wings in the air seems like the trees of a forest agitated by the wind. The first direction of this formidable column is always against the wind, which if not too strong, the column will extend about a couple of leagues. The locusts then make a halt, when the most dreadful havoc begins; their sense of smell being so delicate, they can find at that distance a corn field or a garden, and, after demolishing it, rise again in pursuit of another;

this may be said to be done in an instant. Each seems to have, as it were, four arms and two feet: the males climb up the plants, as sailors do the shrouds of a ship, and nip off the tender buds, which fall to the females below.

"Many old people assured me, when so much mischief was done in 1754, it was the third time in their remembrance, and that they always are found in the pasture grounds of Estremadura, from whence they spread into the other provinces of Spain. They are certainly indigenous, being of a different shape from those of the North or the Levant, as is evident in comparing them with such in the cabinets of natural history. The locust of Spain is the only one that has rose-coloured wings: besides, it is impossible they can come from any other part. From the north it is clear they do not, by the observation of so many ages; from the south they cannot, without crossing the sea, which is hardly possible by the shortness of their flight: and, like birds of passage, they would be known. I once saw a cloud of them pass over Malaga, and move towards the sea, and go over it, for about a quarter of a league, to the great joy of the inhabitants, who concluded they would soon be drowned; but, to their disappointment, they suddenly veered about towards the coast, and pitched upon an uncultivated space surrounded with vineyards, which they soon after quitted. When once they appear, let the number demolished be ever so great, the proportion remaining is still too considerable: therefore, the only way to put an end to such a calamity is to attack them beforehand, and destroy their eggs, by which means they might be totally extirpated."

GRYNÆUS (Simon), son to a peasant of Suabia, born in 1493, was Greek professor at Heidelberg in 1523. He took a tour into England, and received great civility from the lord chancellor Sir Thomas More, to whom Erasmus had recommended him. He was a learned and laborious man, and did great service to the commonwealth of letters. He was the first who published the *Almagest* of Ptolemy in Greek. He also published a Greek Euclid, and Plato's works, with some commentaries of Proclus.

GRYPHIUS (Sebastian), a celebrated printer of Lyons in France, was a German, and born at Suabia near Augsbourg in 1494. He restored the art of printing at Lyons, which was before exceedingly corrupted; and the great number of books printed by him are valued by the connoisseurs. He printed many books in Hebrew, Greek, and Latin, with new and very beautiful types; and his editions are no less accurate than beautiful. The reason is, that he was a very learned man, and perfectly versed in the languages of such books as he undertook to print. He died in 1556 in his 63d year: and his trade was carried on honourably in the same city by his son, Anthony Gryphius. One of the most beautiful books of Sebastian Gryphius is a Latin Bible: it was printed 1550, with the largest types that had then been seen, in 2 vols. folio.

GRYPHITES, in natural history, in English CROW'S STONE, an oblong fossil shell, very narrow at the head, and becoming gradually wider to the extremity, where it ends in a circular limb; the head or beak of this is very hooked or bent inward. They are frequently found in our gravel or clay-pits in many counties. There are three or four distinct species of them; some are extremely rounded and convex on the back, others less so; and the plates of which they are composed are in some smaller and thinner, in others thicker and larger, in specimens of the same bigness. See the article FOSSIL, and plate 32. Vol. III.

GUADALAJARA, or GUADALAXARA, a town of Spain, in New Castile, on the river Heræres, 30 miles N. E. of Madrid. Lon. 2. 47. W. Lat. 40. 36. N.

GUADALAJARA, the capital of a rich and fertile province of

the same name in N. America, with a bishop's see, 217 miles W. of Mexico. Lon. 104. 49. W. Lat. 20. 50. N.

GUADALAVIAR, a river of Spain, which rises on the confines of Arragon, crosses the province of Valencia, and falls into the Mediterranean, a little below the town of Valencia.

GUADALOUPE, a handsome town of Spain, in Estremadura, with a celebrated convent. It is seated on a rivulet of the same name. Lon. 5. 3. E. Lat. 39. 12. N.

GUADALOUPE, one of the Leeward Islands in the W. Indies, lying between Antigua and Dominica, in lon. 62. 0. W. and lat. 16. 20. N. It is divided into two parts by a narrow strait, called the Salt River. At this place the land on each side is not above four miles broad, and by this strait the sea on the N. W. communicates with that on the S. E. The N. W. part is 60 miles in length, and 24 in breadth. The S. E. part, in extent, is much the same. The French began to settle this island in 1632. It was taken by the English in 1759, but restored in 1763. It is said to be the best of all the Caribbee Islands, the soil being exceedingly good, and well watered near the sea, by rivulets which fall from the mountains. On this island is a hill called the Mountain of Sulphur: on the E. side of it are two mouths, which open into a pit of sulphur: they frequently emit thick clouds of black smoke, with sparks of fire: the Negroes who sell brimstone fetch it from this pit.

GUADALQUIVER, one of the most famous rivers of Spain, which rises in Andalusia, and falls into the gulf of Cadiz.

GUADIANA, a river of Spain, which rises in New Castile, separates Algarve from Andalusia, and falls into the bay of Cadiz, between Castro Marino and Agramonte.

GUADIX, a town of Spain, in the kingdom of Granada, with a bishop's see. It was taken from the Moors in 1253, who afterwards retook it; but the Spaniards again got possession of it in 1489. It is seated in a fertile country, in W. lon. 2. 12. N. lat. 37. 5.

GUAIACUM, LIGRUM VITÆ, or *Pockwood*; a genus of the monogynia order, belonging to the decandria class of plants, and in the natural method ranking under the 14th order, *Gruinales*. The calyx is quinquefid and unequal; the petals five, and inserted into the calyx; the capsule is angulated, and trilocular or quinquelocular. The *Species* are, 1. The *officinale*, or common lignum vitæ used in medicine, is a native of the West India Islands and the warmer parts of America. There it becomes a large tree, having a hard, brittle, brownish bark, not very thick. The wood is firm, solid, ponderous, very resinous, of a blackish yellow colour in the middle, and of a hot aromatic taste. The smaller branches have an ash coloured bark, and are garnished with leaves divided by pairs of a bright green colour. The flowers are produced in clusters at the end of the branches, and are composed of oval concave petals of a fine blue colour. 2. The *sanctum*, with many pairs of obtuse lobes, hath many small lobes placed along the mid rib by pairs of a darker green colour than those of the foregoing sort. The flowers are produced in loose bunches towards the end of the branches, and are of a fine blue colour, with petals fringed on the edges. This species is also a native of the West India islands, where it is called *basilard lignum vitæ*. 3. The *Afrum*, with many blunt-pointed leaves, is a native of the Cape of Good Hope. The plants retain their leaves all the year, but have never yet flowered in this country.

The first species can only be propagated by seeds, which must be procured from the countries where it naturally grows. They must be sown fresh in pots, and plunged into a good hot-bed, where they will come up in six or eight weeks. While young, they may be kept in a hot-bed of tan-bark under a frame during the summer; but in autumn they must be removed into the

bark stove, where they should constantly remain. The second sort may be propagated the same way; but the third is to be propagated by layers, and will live all the winter in a good greenhouse.

The wood of the first species is of very considerable use both in medicine and in the mechanical arts. It is so compact and heavy as to sink in water. The outer part is often of a pale yellowish colour; but the heart is blacker, or of a deep brown. Sometimes it is marbled with different colours. It is so hard as to break the tools which are employed in felling it, and is therefore seldom used as firewood, but is of great use to the sugar-planters for making wheels and cogs to the sugar-mill. It is also frequently wrought into bowls, mortars, and other utensils. It is brought over hither in large pieces of four or five hundred weight each; and from its hardness and beauty is in great demand for various articles of turnery ware.

The wood, gum, bark, fruit, and even the flowers of this tree, have been found to possess medicinal virtues; but it is only the three first, and more particularly the wood and resin, which are now in general use in Europe. The wood has little or no smell, except when heated, or while rasping, and then a slight aromatic one is perceived. When chewed, it impresses a mild acrimony, biting the palate and fauces. Its pungency resides in its resinous matter, which it gives out in some degree to water by boiling, but spirit extracts it wholly.

The resin is obtained by wounding the bark in different parts of the body of the tree, or by what has been called *jagging*. It exudes copiously from these wounds, though gradually; and when a quantity is found accumulated upon the several wounded trees, hardened by exposure to the sun, it is gathered and packed in small kegs for exportation. This resin is of a friable texture, of a deep greenish colour, and sometimes of a reddish hue; it has a pungent acrid taste, but little or no smell unless heated. The tree also yields a spontaneous exudation from the bark, which is called the *native gum*, and is brought to us in small irregular pieces, of a bright semipellucid appearance, and differs from the former in being much purer.

Guaiacum was first introduced into Europe as a remedy for the venereal disease, and appears to have been used in Spain so early as 1508. The great success attending its administration before the proper use of mercury was known, brought it into such repute, that it is said to have been sold for seven old crowns a-pound. It did not, however, continue to maintain its reputation; but was found generally to fail where the disease was inveterate, and was at length superseded by mercury, to which it now only serves occasionally as an adjuvant. The general virtues of guaiacum are those of a warm stimulating medicine; strengthening the stomach and other viscera, and remarkably promoting the urinary and cuticular discharges: hence, in cutaneous eruptions, it is deemed eminently useful; as well as in the rheumatism when given in a sufficient dose. The resin is the most active, and the efficacy of the wood, &c. depends upon the quantity of this contained in them. The resin is given from a few grains to a scruple or half a dram, which last dose proves for the most part considerably purgative. Dissolved in spirit of wine, and afterwards combined with water, by means of mucilage or the yolk of egg, or in form of the simple or volatile tincture, it is much employed in gout and chronic rheumatism. These last have been given to the extent of half an ounce twice a day, and are sometimes usefully combined with tincture of opium.

GUALDO, a town of Italy, in the marquisate of Ancona, eight miles N. W. of Nocera. In 1751 it was almost destroyed by an earthquake. Lon. 12. 43. E. Lat. 43. 6. N.

GALEOR, GUALIOR, or *Gawalior*, a large town of Hindostan in Asia, and capital of a province of the same name, with an ancient and celebrated fortress of great strength. It is

situated in the very heart of Hindostan Proper, being about 80 miles to the south of Agra, the ancient capital of the empire, and 130 from the nearest part of the Ganges. From Calcutta it is, by the nearest route, upwards of 800 miles, and 910 by the ordinary one; and about 280 from the British frontiers. Its latitude is 26. 14. and longitude 78. 26. from Greenwich. The fortress of Galeor stands on a vast rock of about four miles in length, but narrow, and of unequal breadth, and nearly flat at the top. The sides are so steep as to appear almost perpendicular in every part; for where it was not naturally so, it has been scraped away; and the height from the plain below is from 200 to 300 feet. The rampart conforms to the edge of the precipice all round; and the only entrance to it is by steps running up the side of the rock, defended on the side next the country by a wall and bastions, and farther guarded by seven stone gateways, at certain distances from each other. The area within is full of noble buildings, reservoirs of water, wells, and cultivated land; so that it is really a little district in itself. At the north-west foot of the mountain is the town, pretty large, and well built; the houses all of stone.

GUAM, the chief of the Ladrone Islands, in the N. Pacific Ocean, 100 miles in circumference. It is subject to the Spaniards, who have a garrison here; but the inhabitants are almost all natives of the country, and reputed to be very skilful in building boats. It abounds with excellent fruit, and the air is wholesome; notwithstanding which the natives are subject to a kind of leprosy. Lon. 15. 15. E. Lat. 13. 5. N.

GUAMANGA, a town of S. America, capital of a province of the same name in Peru, with a bishop's see. It is remarkable for its sweetmeats, manufactures, and mines of gold, silver, loadstones, and particularly quicksilver. It is 200 miles E. of Lima. Lon. 73. 25. W. Lat. 12. 40. S.

GUANAHAMI, or CAT ISLAND, one of the Bahama Islands, the first discovered by Christopher Columbus, in 1492, and named by him St. Salvador. Lon. 75. 5. W. Lat. from 24. 10. to 24. 40. N.

GUANUGO, a rich town of S. America, capital of a district of the same name, that abounds in all the necessaries of life. It is 112 miles N. E. of Lima. Lon. 74. 55. W. Lat. 9. 55. S.

GUANAZAVELCA, a rich town of S. America, in Peru, in a country abounding in mines of quicksilver. It is 159 miles from Pisca. Lon. 74. 39. W. Lat. 12. 36. S.

GUARANTEE, or WARRANTEE, in law, a term relative to warrant or warranter, properly signifying him whom the warranter undertakes to indemnify or secure from damage. *Guarantee*, however, is more frequently used for a warranter, or a person who undertakes and obliges himself to see a second person perform what he has stipulated to the third. See WARRANTY.

GUARD, in the military art, is a duty performed by a body of men, to secure an army or place from being surprised by an enemy. In garrison the guards are relieved every day: hence it comes that every soldier mounts guard once every three or four days in time of peace, and much oftener in time of war. See HONOURS.

Advanced Guard, called also *Van Guard*, is a party of either horse or foot that marches before a more considerable body, to give notice of any approaching danger. These guards are either made stronger or weaker, according to situation, the danger to be apprehended from the enemy, or the nature of the country.

Artillery Guard, is a detachment from the army to secure the artillery when in the field. Their *corps de garde* is in the front of the artillery park, and their sentries dispersed round the same. This is generally a 48-hours guard; and upon a march, this guard marches in the front and rear of the artillery,

and must be sure to leave nothing behind : if a gun or waggon breaks down, the officer that commands the guard is to leave a sufficient number of men to assist the gunners in getting it up again. *Artillery Quarter-GUARD*, is frequently a non-commissioned officer's guard from the royal regiment of artillery, whose *corps de garde* is always in the front of their incampment. *Artillery Rear GUARD*, consists of a corporal and six men, posted in the rear of the park.

Corps de GARDE, are soldiers entrusted with the guard of a post under the command of one or more officers. This word also signifies the place where the guard mounts.

Grand GUARD, three or four squadrons of horse, commanded by a field officer, posted at about a mile or a mile and a half from the camp, on the right and left wings, towards the enemy, for the better security of the camp.

Forage GUARD, a detachment sent out to secure the foragers, and who are posted at all places, where either the enemy's party may come to disturb the foragers, or where they may be spread too near the enemy, so as to be in danger of being taken. This guard consists both of horse and foot, and must remain on their posts till the foragers are all come off the ground.

Main GUARD, is that from which all other guards are detached. Those who are for mounting guard assemble at their respective captain's quarters, and march from thence to the parade in good order; where, after the whole guard is drawn up, the small guards are detached to their respective posts: then the subalterns draw lots for their guards, who are all under the command of the captain of the main guard. This guard mounts in garrison at different hours, according as the governor pleases.

Piquet GUARD, a good number of horse and foot, always in readiness in case of an alarm: the horses are generally saddled all the time, and the riders booted. The foot draw up at the head of the battalion, frequently at the beating of the tat-too; but afterwards return to their tents, where they hold themselves in readiness to march upon any sudden alarm. This guard is to make resistance in case of an attack, until the army can get ready.

Baggage GUARD, is usually an officer's guard, who has the care of the baggage on a march. The waggons should be numbered by companies, and follow one another regularly: vigilance and attention in the passage of hollow ways, woods, and thickets, must be strictly observed by this guard.

Quarter GUARD, is a small guard commanded by a subaltern officer, posted in the front of each battalion, at 222 feet before the front of the regiment.

Rear GUARD, that part of the army which brings up the rear on a march, generally composed of all the old grand guards of the camp. The rear-guard of a party is frequently eight or ten horse, about 500 paces behind the party. Hence the advance-guard going out upon a party, form the rear guard in their retreat. *Rear Guard*, is also a corporal's guard placed in the rear of a regiment, to keep good order in that part of the camp.

Standard GUARD, a small guard under a corporal, out of each regiment of horse, who mount on foot in the front of each regiment, at the distance of 20 feet from the streets, opposite the main street of an encampment.

Trench GUARD, only mounts in the time of a siege, and sometimes consists of three, four, or six battalions, according to the importance of the siege. This guard must oppose the besieged when they sally out, protect the workmen, &c.

Provost GUARD, is always an officer's guard that attends the provost in his rounds, either to prevent desertion, marauding, roving, &c. See PROVOST.

GUARD, in fencing, implies a posture proper to defend the body from the sword of an antagonist.

GUARDS, also imply the troops kept to guard the king's person, and consist both of horse and foot.

Horse GUARDS, in England, were gentlemen chosen for their bravery, to be entrusted with the guard of the king's person; and were divided into four troops, called *the 1st, 2d, 3d, and 4th troops of horse guards*. The first troop was raised in the year 1660, and the command given to lord Gerard; the second in 1661, and the command given to Sir Philip Howard; the third in 1693, and the command given to earl Feversham; the fourth in 1792, and the command given to earl Newburgh. Each troop had one colonel, two lieutenant-colonels, one cornet and major, one guidon and major, four exempts and captains, four brigadiers and lieutenants, one adjutant, four sub-brigadiers and cornets, and 60 private men. But the four troops are now turned into two regiments of life-guards.

Horse-Grenadier GUARDS, are divided into two troops, called *the 1st and 2d troops of horse-grenadier guards*. The first troop was raised in 1693, and the command given to lieutenant-general Cholmondeley; the second in 1702, and the command given to lord Forbes. Each troop has one colonel, lieutenant-colonel, one guidon or major, three exempts and captains, three lieutenants, one adjutant, three cornets, and 60 private men.

Yeomen of the GUARD, first raised by Henry VII. in the year 1485. They are a kind of pompous foot-guards to the king's person, and are generally called by a nickname the *Beef Eaters*. They were anciently 250 men of the first rank under gentry, and of larger stature than ordinary, each being required to be six feet high. At present there are but 100 in constant duty, and 70 more not on duty; and when any one of the 100 dies, his place is supplied out of the 70. They go dressed after the manner of king Henry VIII's time. Their first commander or captain was the earl of Oxford, and their pay is 2s. 6d. per day.

Foot-GUARDS, are regiments of foot appointed for the guard of his majesty and his palace. There are three regiments of them, called *the 1st, 2d, and 3d regiments of foot-guards*. They were raised in the year 1660; and the command of the first given to colonel Russel, that of the second to general Monk, and the third to the earl of Linlithgow. The first regiment is at present commanded by one colonel, one lieutenant-colonel, three majors, 23 captains, one captain-lieutenant, 31 lieutenants, and 24 ensigns; and contains three battalions. The second regiment has one colonel, one lieutenant-colonel, two majors, 14 captains, one captain lieutenant, 18 lieutenants, 16 ensigns; and contains only two battalions. The third regiment is the same as the second.

GUARD Boat, a boat appointed to row the rounds amongst the ships of war which are laid up in any harbour, &c. to observe that their officers keep a good look-out, calling to the guard-boat as she passes, and not suffering her crew to come on board, without having previously communicated the watch-word of the night.

GUARD-SHIP, a vessel of war appointed to superintend the marine affairs in a harbour or river, and to see that the ships which are not commissioned have their proper watch-word kept duly, by sending her guard-boats around them every night. She is also to receive seamen who are impressed in the time of war.

GUARDIAN, in law, a person who has the charge of any thing; but more commonly it signifies one who has the custody and education of such persons as have not sufficient discretion to take care of themselves and their own affairs, as children and idiots. Their business is to take the profits of the minor's lands to his use, and to account for the same: they ought to sell all moveables within a reasonable time, and to convert them into land or money, except the minor is near of age, and may want such things himself; and they are to pay interest for the money in their hands, that might have been so placed out; in which case it will be presumed that the guardians made use of it

themselves. They are to sustain the lands of the heir, without making destination of any thing thereon, and to keep it safely for him: if they commit waste on the lands, it is a forfeiture of the guardianship, 3 Edw. 1. And where persons, as guardians, hold over any land, without the consent of the person who is next intitled, they shall be adjudged trespassers, and shall be accountable. 6 Ann. cap. xviii.

GUARDIAN or *Warden of the Cinque ports*, is an officer who has the jurisdiction of the cinque-ports, with all the power that the admiral of England has in other places. Camden relates, that the Romans, after they had settled themselves and their empire in our island, appointed a magistrate, or governor, over the east parts, where the Cinque ports lie, with the title of *comes littoris Saxonici per Britanniam*; having another who bore the like title on the opposite side of the sea. Their business was to strengthen the sea coast with munition, against the outrages and robberies of the barbarians; and that antiquary takes our warden of the Cinque-ports to have been erected in imitation thereof. The wardenship is a place of value, supposed worth 7000*l. per annum*.

GUARDIAN of the Spiritualities, the person to whom the spiritual jurisdiction of any diocese is committed, during the time the see is vacant. A guardian of the spiritualities may likewise be either such in law, as the archbishop is of any diocese within his province; or by delegation, as he whom the archbishop or vicar-general for the time appoints. Any such guardian has power to hold courts, grant licences, dispensations, probates of wills, &c.

GUAREA, in botany; a genus of the monogynia order, belonging to the octandria class of plants. The calyx is quadrid; the petals four: the nectarium cylindric, having the antherae in its mouth; the capsule is quadrilocular and quadrivalvular; the seeds solitary.

GUARINI (Battista), a celebrated Italian poet, born at Ferrara in 1538. He was great-grandson to Guarino of Verona, and was secretary to Alphonso Duke of Ferrara, who intrusted him with several important commissions. After the death of that prince, he was successively secretary to Vincenzo de Gonzaga, to Ferdinand de Medicis grand duke of Tuscany, and to Francis Maria de Feltri duke of Urbino. But the only advantages he reaped under these various masters were great encomiums on his wit and compositions. He was well acquainted with polite literature, and acquired immortal reputation by his Italian poems, especially by his *Pastor Fido*, the most known and admired of all his works, and of which there have been innumerable editions and translations. He died in 1612.

GUARDAFUI, a cape of Africa, at the eastern extremity of Adel, and the entrance of the strait of Babelmandel. Lon. 52. 5. E. Lat. 11. 46. N.

GUARDIA, or **GUARDA**, a town of Portugal, in the province of Beira, with a bishop's see. It contains about 2300 inhabitants, is fortified both by art and nature, and has a stately cathedral. W. long. 5. 17. N. lat. 40. 20.

GUARDIA-Alferez, a town of Italy, in the kingdom of Naples, and in the Contado-di-Molise, with a bishop's see. E. long. 15. 53. N. lat. 51. 50.

GUARGALA, or **GUERGUELA**, a town of Africa, and capital of a small kingdom of the same name, in Biledulgerid, to the south of Mount Atlas. E. long. 9. 55. N. lat. 28. 0.

GUARIBA, in natural history, the name of a species of monkey found in the West Indies. See **SIMIA**.

GUASTALLA, a strong town of Italy, in the duchy of Mantua, ceded to the duke of Parma in 1748. Here the imperial general Konigseg attacked the French army in 1734, but was repulsed with the loss of 5000 men. It is seated near the river Po, 15 miles N. of Reggio. Lon. 10. 38. E. Lat. 44. 56. N.

GUATIMALA, *the Audience of*, in North America, and in New Spain, is above 750 miles in length, and 450 in breadth. It abounds in chocolate, which they make use of instead of money. It has 12 provinces under it: and the native Americans, under the dominions of Spain, profess Christianity; but it is mixed with a great many of their own superstitions. There is a great chain of high mountains, which run across it from E. to W. and it is subject to earthquakes and storms. It is, however, very fertile; and produces, besides chocolate, great quantities of cochineal and cotton.

GUATIMALA, a province of North America, in New Spain, and in the Audience of the same name; bounded on the W. by Soconusco, on the N. by Verapaz and Honduras, on the E. by Nicaragua, and on the S. by the south sea. St. Jago de Guatimala is the capital of the whole Audience.

GUATIMALA, a large and rich town of North America, in New Spain; and capital of a government of the same name, with a bishop's see, and an university. It carries on a great trade, especially in chocolate. W. long. 91. 30. N. lat. 14. 0.

GUATIMALA (the Volcano of), is a mountain, which throws out fire and smoke. St. Jago de Guatimala was almost ruined by it in 1541. It was afterwards rebuilt at a good distance from this dreadful mountain. A few years ago, however, it was again destroyed, with circumstances more terrible perhaps than any mentioned in history.

GUAVA, in botany. See **PSIDIUM**.

GUAXACA, a province of North America, in New Spain, which is very fertile in wheat, Indian corn, cochineal, and cassia. It is bounded by the gulph of Mexico on the north, and by the South-Sea on the south. It contains mines of gold, silver, and crystal. Guaxaca is the capital town.

GUAXACA, a town of North America, in the Audience of Mexico, and capital of a province of the same name, with a bishop's see. It is without walls, and does not contain above 2000 inhabitants; but it is rich, and they make very fine sweetmeats and chocolate. It has several rich convents, both for men and women. W. long. 100. N. lat. 17. 45.

GUAYRA, a district of the province of La Plata, in South America, having Brasil on the east, and Paraguay on the west.

GUBEN, a handsome town of Germany, in Lower Lusatia, seated on the river Neisse, and belonging to the house of Sax-Merlenburg. E. long. 14. 59. N. lat. 51. 55.

GUBER, a kingdom of Africa, in Negroland. It is surrounded with high mountains; and the villages, which are many, are inhabited by people who are employed in taking care of their cattle and sheep. There are also abundance of artificers and linen-weavers, who send their commodities to Tombuto. The whole country is overflowed every year by the inundations of the Niger, and at that time the inhabitants sow their rice. There is one town which contains almost 6000 families, among whom are many merchants.

GUBIO, a town of Italy, in the territory of the church, and in the duchy of Urbino, with a bishop's see. E. long. 12. 41. N. lat. 43. 18.

GUDGEON, in ichthyology; a species of cyprinus. See **BARBEL**. This fish, though small, is of so pleasant a taste, that it is very little inferior to a smelt. They spawn twice in the summer-season; and their feeding is much like the barbels in streams and on gravel, slighting all manner of flies: but they are easily taken with a small red worm, fishing near the ground; and being a leather-mouthed fish, will not easily get off the hook when struck. The gudgeon may be fished for with float, the hook being on the ground; or by hand, with a running line on the ground, without cork or float. But although the small red worm above mentioned is the best bait for this fish, yet wasps, gentles, and ear-baits will do very well. Some fish for gudgeons with two or three hooks at once, and find very plea-

fant sport, where they rise any thing large. In angling for them, it is necessary to stir up the sand or gravel with a long rake; this will make them gather to that place, and bite with more eagerness.

Sea-GUDGEON, Rock-fish, or Black Goby. See GORBUS.

GUDGEON, in mechanics, a kind of catch used in various machines to assist their operations. In vol. XI. of the Trans. of the Society for the Encouragement of Arts, &c. we have the following account of a *gudgeon* on an improved construction, for the upright shafts of mills. "This gudgeon is formed of hard steel, and works on a hard steel bed; is circular, three inches diameter, and three-fourths of an inch thick: from its upper side a rib projects, which, being fixed in the bottom of an upright shaft, the gudgeon works horizontally on a square bed: and that now in the possession of the Society has worked in a mill whose wheel and shaft weighed nearly six tons; and, though it had continued in work seven years, had lost very little of its surface. It ran in a square box of cast iron, having oil therein: and a notch along the whole of the face of the gudgeon admits the oil to insinuate itself between the gudgeon and the bed."

GUEBRES, or GABRES. See GABRES.

GUELPHS, or GUELFs, a celebrated faction in Italy, antagonists of the Gibelins. See GIBELINS. The Guelphs and Gibelins filled Italy with blood and carnage for many years. The Guelphs stood for the Pope against the emperor. Their rise is referred by some to the time of Conrad III. in the twelfth century; by others, to that of Frederic I.; and by others, to that of his successor Frederic II. in the thirteenth century. The name of *Guelph* is commonly said to have been formed from *Welfe*, or *Welfo*, on the following occasion: The emperor Conrad III. having taken the duchy of Bavaria from Welfe VI. brother of Henry duke of Bavaria, Welfe, assisted by the forces of Roger king of Sicily, made war on Conrad, and thus gave birth to the faction of the Guelfs. Others derive the name *Guelfs* from the German *Wolff*, on account of the grievous evils committed by that cruel faction: others deduce the denomination from that of a German called *Guelfe*, who lived at Pistoye; adding, that his brother, named *Gibel*, gave his name to the Gibelins.

GUELDERLAND, or GUELDRES, a territory of the Netherlands. That part which is a district of the town of Guldres belongs to the king of Prussia; Ruremond and its dependencies to the house of Austria; and Venlo and Stevenswaert to the States General.

GUELDRES, a strong town of the Netherlands, in the duchy of the same name, ceded to the king of Prussia by the peace of Utrecht. It is 10 miles N. E. of Venlo. Lon. 6. 0. E. Lat. 51. 26. N.

GUERAND, a town of France, in the department of Lower Loire and late province of Brittany. It carries on a considerable trade in white salt, and is three miles from the sea, and 250 W. S. W. of Paris. Lon. 2. 20. W. Lat. 47. 20. N.

GUERCINO. See BARBIERI.

GUERET, a town of France, in the department of Creuse and late province of Marche, seated on the river Gartampe; 35 miles N. E. of Limoges, and 170 S. of Paris. Lon. 1. 56. E. Lat. 46. 10. N.

GUELICKE, or GUERICKE, (Otho), the most celebrated mathematician of his time, was born in 1602. He was the inventor of the air-pump; and author of several works in natural philosophy, the chief of which is *Experimenta Magdeburgica*. He died in 1686.

GUERNSEY, an island on the coast of Normandy, subject to Great Britain. It is naturally strong, being surrounded by high rocks, and is well situated for trade in time of peace, and in time of war to annoy the French with our privateers. It

is 10 miles in length, as much in breadth, and contains 10 parishes. The natives speak French, it having been a part of Normandy, and is still governed by the Norman laws. Lon. 2. 37. W. Lat. 49. 32. N.

GUETTARDA, in botany; a genus of the heptandria order, belonging to the monœcia class of plants, and in the natural method ranking under the 38th order, *Triumf.* The male calyx is cylindrical; the corolla cleft into seven parts, and funnel-shaped. The female calyx cylindrical; the corolla cleft into seven parts; one pistil, and the fruit a dry plum.

GUIANA, a country of S. America, between the rivers Oronoko and Amazon, and to the E. of Peru. The interior parts of the country are inhabited by savages, who have different languages and customs; and some of them build their houses on trees, to be secure from the inundations of the rivers. The French possess a part of the coast, which is called Equinoctial France, and the Dutch another. Here is a perpetual spring, and it produces large quantities of sugar-canes. It is between the equator and eight degrees of N. lat. See CAYENNE and SURINAM.

GUIAQUIL, a town, bay, and harbour of S. America, in Peru, capital of an audience of the same name. It faces a low island close by the river, partly on the side, and partly at the foot of a hill, which descends gently toward the river. It is divided by the stream into two parts, called the Old and the New, joined by a bridge for foot passengers, half a mile long. The situation is in such a boggy ground, and so dirty in winter, that, without the bridge, there would be scarce any passing from one house to another. It has but one regular street, along the river side. Before the church of St. Jago is a handsome parade, but the church itself is gone to decay. There are three other churches, well-adorned with altars and pictures. It is 140 miles N. E. of Paita. Lon. 81. 6. W. Lat. 2. 11. N.

GUIARA, a sea-port town of South America, and on the Caracca coast. The English attempted to take it in 1739 and 1743; but they were repulsed both times. W. long. 66. 5. N. lat. 10. 35.

GUICCIARDINI (Francisco), a celebrated historian, born at Florence in 1482. He professed the civil law with reputation, and was employed in several embassies. Leo X. gave him the government of Modena and Reggio, and Clement VII. that of Romagna and Bologna. Guicciardini was also lieutenant-general of the pope's army, and distinguished himself by his bravery on several occasions; but Paul III. having taken from him the government of Bologna, he retired to Florence, where he was made counsellor of state, and was of great service to the house of Medicis. He at length retired into the country to write his history of Italy, which he composed in Italian, and which comprehends what passed from the year 1494 to 1532. This history is greatly esteemed, and was continued by John Baptist Adriani, his friend. He died in 1540.

GUICCIARDINI (Lewis), nephew of the foregoing, composed a history of the Low Countries, and memoirs of the affairs of Europe, from 1550 to 1560. He wrote with great spirit against the persecution of the duke d'Alva, for which the latter imprisoned him. He died in 1583.

GUIDI (Alexander), an eminent Italian poet, born at Pavia in 1650. Having a desire to see Rome, he there attracted the notice of queen Christina of Sweden, who retained him at her court; he also obtained a considerable benefice from pope Innocent XI. and a pension from the duke of Parma. For a good office he did the state of Milan with prince Eugene, he was enrolled among the nobles and decurions of that town; and died in 1712. Nature had been kinder to his intellects than to his exterior form: his body was small and crooked, his head was large, and he was blind of his right eye. A collection of his works was published at Verona in 1726.

GUIDO (Reni), an illustrious Italian painter, born at Bologna in 1595. In his early age he was the disciple of Denis Calvert, a Flemish master of good reputation; but afterwards entered himself in the school of the Caracci. He first imitated Ludovico Caracci; but fixed at last in a peculiar style of his own, that secured him the applause of his own time and the admiration of posterity. He was much honoured, and lived in splendor: but an unhappy attachment to gaming ruined his circumstances; the reflection of which brought on a languishing disorder, that put an end to his life in 1642. There are several designs of this great master in print, etched by himself.

GUIDON, a sort of flag or standard borne by the king's life-guard; being broad at one extreme, and almost pointed at the other, and slit or divided into two. The guidon is the ensign or flag of a troop of horse-guards. See **GUARD**. The term *Guidon* also denotes the officer who bears the guidon. The guidon is in the horse-guards what the ensign is in the foot. The guidon of a troop of horse takes place next below the cornet.

GUIDONS, *guidones*, or *schola guidonum*, was a company of priests established by Charlemagne, at Rome, to conduct and guide pilgrims to Jerusalem, to visit the holy places: they were also to assist them in case they fell sick, and to perform the last offices to them in case they died.

GUIENNE, a late province of France, which now forms the department of Gironde and that of Lot and Garonne.

GUILANDINA, the **NICKAR TREE**; a genus of the monogynia order, belonging to the decandria class of plants, and in the natural method ranking under the 33d order, *Lomentaceæ*. The calyx is nophyllous and salver-shaped; the petals, inserted into the neck of the calyx, nearly equal. The seed-vessel a legumen. The *Species* are, 1. The *bonduc*, or yellow nickar. 2. The *bonducell*, or gray nickar. These are climbing plants, natives of the West Indies, where they rise to the height of twelve or fourteen feet: the flowers come out at the wings of the stalks, and are composed of five concave yellow petals. They are succeeded by pods about three inches long and two broad, closely armed with slender spines, opening with two valves, each inclosing two hard seeds about the size of children's marbles, of a yellowish colour. 3. The *moringa*, or morunga nickar, is a native of the island of Ceylon, and some places on the Malabar coast. It rises to the height of 25 or 30 feet, having flowers produced in loose bunches from the sides of the branches, and composed of an unequal number of petals.

These plants being natives of warm climates require to be kept through the winter in a stove in this country. They are propagated by seeds; but those of the first sort are so hard, that unless they are soaked two or three days in water before they are put into the ground, or placed under the pots in the tan-bed to soften their covers, they will remain for years without vegetating.—The roots of the third sort are scraped when young, and used by the inhabitants of Ceylon and Malabar as those of horse-radish are in Europe. The wood dyes a beautiful blue colour. It is the *lignum nephriticum* of the dispensatories, and is brought over in large, compact, ponderous pieces, without knots, of a whitish or pale yellow colour on the outside, and dark coloured or reddish within: the bark is usually rejected. This wood imparts to water or rectified spirit a deep tincture; appearing, when placed between the eye and the light, of a golden colour; in other situations blue: pieces of another wood are sometimes mixed with it, which give only a yellow colour to water. The nephritic wood has scarce any smell, and very little taste. It stands recommended in difficulty of urine, and all nephritic complaints, and is said to have this peculiar advantage, that it does not, like the warmer diuretics, heat or irritate the urinary passages. Practitioners, however, have not found these praises warranted by experience.

GUILD (from the Saxon *gildan* "to pay"), signifies a fraternity or company, because every one was *gildare*, i. e. to pay something towards the charge and support of the company. As to the original of these guilds or companies: It was a law among the Saxons, that every freeman of fourteen years of age should find sureties to keep the peace, or be committed: upon which certain neighbours, consisting of ten families, entered into an association, and became bound for each other, either to produce him who committed an offence, or to make satisfaction to the injured party: that they might the better do this, they raised a sum of money among themselves, which they put into a common stock; and when one of their pledges had committed an offence, and was fled, then the other nine made satisfaction out of this stock, by payment of money, according to the offence. Because this association consisted of ten families, it was called a *decennary*: and from hence proceeded later kinds of fraternities. But as to the precise time when these guilds had their origin in England, there is nothing of certainty to be found; since they were in use long before any formal licence was granted to them for such meetings. It seems to have been about the close of the eleventh century, says Anderson, in his History of Commerce, vol. i. p. 70, that merchant-guilds, or fraternities, which were afterwards styled corporations, came first into general use in many parts of Europe. Mr. Madox, in his *Firma Burgi*, chap. i. § 9. thinks they were hardly known to our Saxon progenitors, and that they might be probably brought into England by the Normans; although they do not seem to have been very numerous in those days. The French and Normans might probably borrow them from the free cities of Italy, where trade and manufactures were much earlier propagated, and where possibly such communities were first in use. These guilds are now companies joined together, with laws and orders made by themselves, by the licence of the prince.

GUILD, in the royal boroughs of Scotland, is still used for a company of merchants, who are freemen of the borough. See **BOROUGH**. Every royal borough has a dean of *guild*, who is the next magistrate below the bailiff. He judges of controversies among men concerning trade; disputes between inhabitants touching buildings, lights, water-courses, and other nuisances; calls courts, at which his brethren of the *guild* are bound to attend; manages the common stock of the *guild*; and amerces and collects fines.

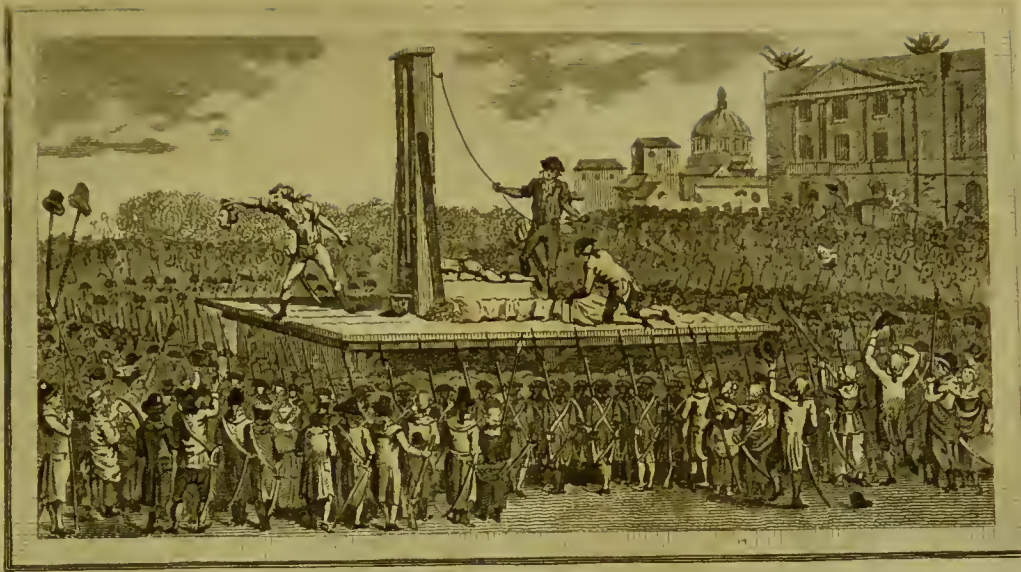
GUILD, *Gild*, or *Geld*, is also used among our ancient writers, for a compensation or mulct for a fault committed.

GUILD-Hall, the great hall of judicature for the city of London. In it are kept the mayor's court, the sheriff's court, the court of hustings, court of conscience, court of common council, chamberlain's court, &c. Here also the judges sit upon *miscellaneous*, &c.

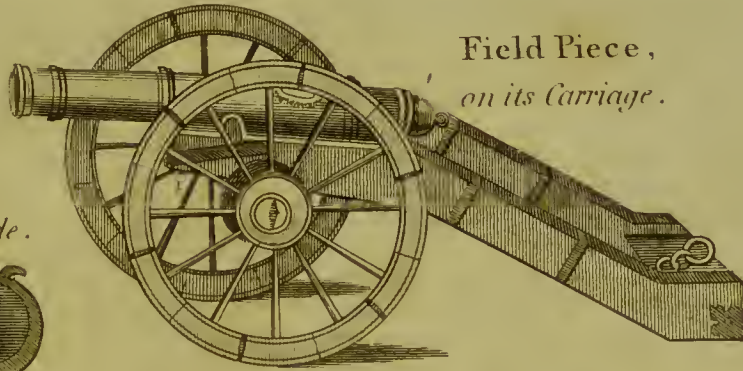
GUILFORD, a large borough in Surry, with a market on Saturday. It is seated on the river Wey, and on the declivity of a hill. It had a large castle, of which some of the walls are still standing. The summer assizes for the county are alternately held here and at Croydon. The Wey is navigable to the Thames, and much corn and timber are carried upon it. It is 17 miles S. W. of Kingston, and 30 S. W. of London. Lon. o. 30. W. Lat. 51. 16. N.

GUILLEMOT, in ornithology. See **COLYMBUS**.

GUILIM (John), of Welch extraction, was born in Herefordshire, about the year 1565. Having completed his education at Brazen-nose college, Oxford, he became a member of the college of arms in London, and was made *rouge croix* pur-suivant, in which post he died in 1621. He published in 1610 a celebrated work intitled *The Display of Heraldry*, folio, which has gone through many editions. To the fifth, which came out in 1679, was added *A treatise of honour civil and military*, by captain John Loggan.



GUNNERY.



Field Piece,
on its Carriage.

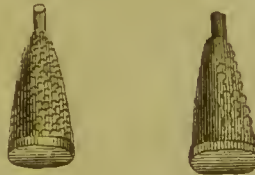


Bomb. Inside.

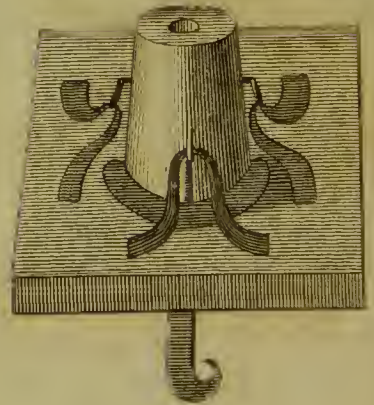
Cartouches.



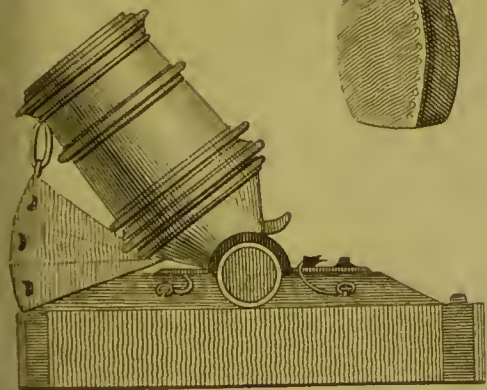
Pine Apple Shot.



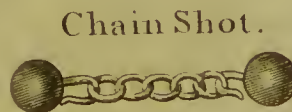
A Petard.



A Mortar on its Bed.



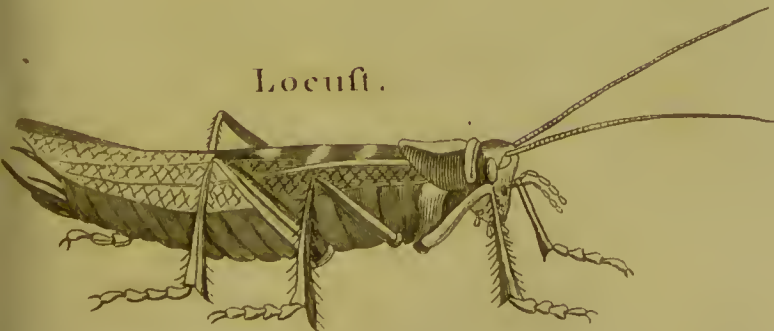
Angels.



Chain Shot.

GRYLLUS.

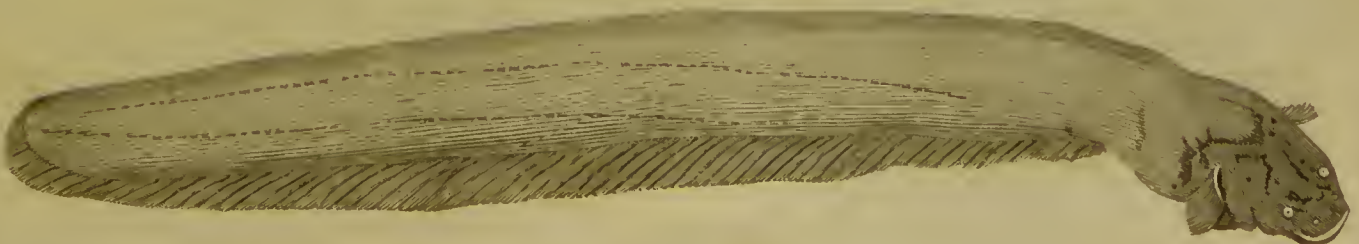
Mole Cricket.



Locust.



Gymnotus Electricus.



GUILLOTINE, an instrument calculated for the expeditious decapitation of criminals, and much used during the revolutionary murders committed lately in France. This machine consists of two upright posts, ten feet high, joined at the top by an horizontal piece of timber. At four feet from the bottom is a cross-bar on which the neck of the criminal is laid, and over that, there falls a similar bar, shaped to receive the neck like the front board of our pillory. On the inner faces of the frame are grooves, along which the extreme edges of an axe slide up and down. The axe is in shape somewhat like the italic capital letter *N*, the oblique stroke representing the sharp edge, which in falling, with a heavy mass of lead affixed to its upper part, severs the culprit's head from his body by a sliding cut. The upright side of the axe is wholly included in the groove which guides it, by means of a cord and pulley, up to a catch or pin, to which a separate cord is connected. The criminal is prepared for his fate by the executioner, who, having first cut off his hair, ties him in a standing posture to a board, which he afterwards inclines, so as to lay the body horizontally with the face downwards, and with the head advanced over a basket placed for its reception. The string being pulled by the executioner, the axe descends, and the head is severed in an instant. Louis XVI, his queen and aunt, and multitudes of persons of both sexes, and of all ranks, who were attached to the Royal cause in France, suffered death in this way. See Plate 2.

A similar machine once existed in England, but was confined in its use to the province of Hardwick, or the places within its precinct. The execution was generally at Halifax. This machine is now destroyed; but one of the same kind is in a room under the parliament-house at Edinburgh, where the use of it was introduced by the Earl of Morton, who took a model of it as he passed through Halifax, and had the misfortune at length to suffer by it himself. In England and Scotland it is called a *Maiden*. Its name, *La Guillotine*, is taken from the name of the person who brought it into use in Paris, as at Lille it is called *Louison*, for the same reason.

There are several engravings of this instrument to be seen; one in wood in 1520; another to a German translation of the works of Petrarch in 1520, and some others: in all which, the axe is straight or semicircular, but always horizontal.—The sloping position of the French axe appears the best for celerity of execution.

The *Guillotine*, it farther appears, was an instrument used by the Romans under the name of *Tympanum*. Enphorion, of Chalcis, quoted by Athenæus, p. 154, tells us, that to be tympanized was to have your head cut off by an axe. According to Photius, the tympanum was a machine of wood, with which the criminal was struck and decollated.

GUINEA, a country of Africa, of which little is known except the coast, thence called the coast of Guinea. It is divided into the Lower and Upper. This last comprehends the Malaguetta Coast, the Tooth Coast, the Gold Coast, Whidah, Great Adra, and Benin. The lower part is commonly called Congo. It is very unhealthy for Europeans, though the negroes live a considerable time. The water is so bad, that it often occasions worms, of a white silver colour, to breed between the skin and the flesh. The inhabitants in general go almost naked, and there seems to be little religion or honesty among them. The commodities purchased there are gum-seneca, at Senegal; grain, upon the Grain Coast; elephant's teeth, upon the Tooth Coast; the greatest plenty of gold upon the Gold Coast; and all, in general, furnish slaves, more or less: indeed, some of all these commodities are to be had in all parts of it. The English, Dutch, French, Danes, and other nations, have factories upon this coast, and purchase slaves and other commodities. There are abundance of little states, whose chiefs the sailors have dignified with the name of kings; but there are very few who de-

serve that title. When they are at war with each other, as they often are, the people taken, on both sides, are sold for slaves; and it is not uncommon for the nearest of kin to sell each other. These unnatural and horrid practices will probably continue, so long as guilty Europeans persevere in their odious traffic in human flesh.

NEW GUINEA, an island of the S. Pacific Ocean, to the N. of New Holland, from which it is separated by Endeavour Strait. The length of this straight, from N. E. to S. W. is 10 leagues, and its breadth about five, except at the N. E. entrance, where it is contracted to somewhat less than two miles by the islands called Prince of Wales' Islands. Except this strait and the land of Cape Deliverance, the whole coast and the circumjacent islands seem to have been minutely examined both by the Dutch and Spaniards. Some traces of a passage between New Holland and New Guinea are also to be found in the accounts of former voyages; but Captain Cook in 1770 had the merit of establishing the fact beyond dispute. New Guinea was thus found to be a long narrow island, extending S. E. from the equator to 12° S. lat. and from 131° to 153° E. long. The land in general is low, but covered with such luxuriance of wood and herbage as can scarcely be conceived. The cocoa-nut, the bread-fruit, and the plantain-tree, beside most of the trees, shrubs, and plants, that are common to all the South Sea islands, are found here in the greatest perfection. The inhabitants make much the same appearance as the New Hollanders.

GUINEA, a gold coin, struck and current in Britain. The value or rate of guineas has varied: it was first struck on the footing of 20s. but by the scarcity of gold it was afterwards advanced to 21s. 6d. It afterwards sunk to 21s. The pound weight troy of gold is cut into 44 parts and a half; each part makes a guinea.—This coin took its denomination *guinea*, because the gold whereof the first was struck was brought from that part of Africa called *Guinea*; for which reason it likewise bore the impression of an elephant.

GUINEA Company. See *AFRICAN COMPANY*.

GUINEA-Hen, in ornithology. See *NUMIDA*.

GUINEA Pig, in zoology. See *MUS*.

GUINEA-Weat. See *ZEAL*.

GUINCAMP, a town of France, in the department of the North Coast and late province of Bretagne, 258 miles W. of Paris. Lon. 2. 56. W. Lat. 48. 36. N.

GUIPUSCOA, a province in the N. of Spain, bounded on the E. by Basques; on the N. by the ocean; on the W. by Biscay; and on the S. by Navarre. Tolosa is the capital.

GUISE, a small town of France, in the department of Aisne, with a strong castle, seated on the river Oise, 15 miles N. E. of St. Quentin, and 95 N. E. of Paris. Lon. 3. 42. E. Lat. 49. 54. N.

GUISE (Henry) of Lorrain, duke of Guise (eldest son of Francois of Lorrain duke of Guise), memorable in the history of France as a gallant officer, but an imperious, turbulent, seditious subject, who placed himself at the head of an armed force, and called his rebel band *The League*. The plan was formed by the cardinal, his younger brother; and under the pretext of defending the Roman Catholic religion, the king Henry III. and the freedom of the state, against the design of the Huguenots, or French Protestants, they carried on a civil war, massacred the Huguenots, and governed the king, who forbid his appearance at Paris; but Guise now became an open rebel, entered the city against the king's express order, and put to the sword all who opposed him. The streets being barricaded to prevent his progress, this fatal day is called in the French history *The day of the barricades*. Masters of Paris, the policy of the Guises failed them: for they suffered the king to escape to Blois, though he was deserted in his palace at Paris by his

very guards. At Blois, Henry convened an assembly of the states of France; the duke of Guise had the boldness to appear to a summons sent him for that purpose: a forced reconciliation took place between him and the king, by the advice of this assembly; but it being accidentally discovered that Guise had formed a design to dethrone the king, that weak monarch, instead of resolutely bringing him to justice, had him privately assassinated, December 23, 1558, in the 38th year of his age. His brother the cardinal shared the same fate the next day.

GUITAR, GUITARRA, a musical instrument of the stringed kind, with five double rows of strings, of which those that are brass are in the middle, except it be for the burden, an octave lower than the fourth. This instrument was first used in Spain and by the Italians. In the former country it is still greatly in vogue. There are few of that nation who cannot play on the guitar; and with this instrument they serenade their mistresses at night. At Madrid and other cities in that country, it is common to meet in the streets young men equipped with a guitar and a dark lanthorn, who, taking their station under the windows, sing, and accompany their voices with this instrument; and there is scarce an artificer or day-labourer in any of the cities or principal towns who does not entertain himself with his guitar.

GULDENSTAEDT (John Anthony), was born at Riga, April 26, 1745; received the rudiments of his education in that town; and in 1763 was admitted into the medical college at Berlin. He completed his studies at Frankfort upon the Oder, and in 1767 received the degree of M. D. in that university. On account of his knowledge of foreign languages, and the considerable progress he had made in natural history, he was considered as a fit person to engage in the expeditions which were planned by the imperial academy. Being invited to St. Petersburg, he arrived in that city in 1768, was created adjunct of the academy, and afterwards, in 1770, member of that society, and professor of natural history. In June 1761 he set out upon his travels, and was absent seven years. From Moscow, where he continued till March 1769, he passed to Voronetz, Tzaritzin, Astracan, and Killar, a fortress upon the western shore of the Caspian, and close to the confines of Persia. In 1770 he examined the districts watered by the rivers Terek, Sunsha, and Alkai, in the eastern extremity of Caucasus; and in the course of the ensuing year penetrated into Ossétia, in the highest part of the same mountain, where he collected vocabularies of the languages spoken in those regions, made inquiries into the history of the people, and discovered some traces of Christianity among them. Having visited Cabarda and the northern chain of the Caucasus, he proceeded to Georgia, and was admitted to an audience of prince Heraclius, who was encamped about ten miles from Tesslis. Having passed the winter here and in examining the adjacent country, he followed in spring the prince to the province of Koketia, and explored the southern districts inhabited by the Turcoman Tartars in the company of a Georgian magnate, whom he had cured of a dangerous disorder. In July he passed into Imeretia, a country which lies between the Caspian and Black Seas, and is bounded on the east by Georgia, on the north by Ossétia, on the west by Mingrelia, and on the south by the Turkish dominions. He penetrated into the middle chain of mount Caucasus, visited the confines of Mingrelia, Middle Georgia, and Eastern and Lower Imeretia; and, after escaping many imminent dangers from the banditti of those parts, fortunately returned to Killar on the 18th of November, where he passed the winter, collecting various information concerning the neighbouring Tartar tribes of the Caucasus, and particularly the Jelegees. In the following summer he journeyed to Cabarda Major, continued his course to mount Beilton, the highest point of the first ridge of the Caucasus; inspected the mines of Maj-

shar, and went to Tcherkaski upon the Don. From thence he made expeditions to Azof and Taganrog, and then, along the new limits to the Dnieper, he finished this year's route at Krementshuk in the government of New Russia. In the ensuing spring, he was proceeding to Crim Tartary; but receiving an order of recall, he returned through the Ukraine to Moscow and St. Petersburg, where he arrived in the month of March 1775. Upon his return, he was employed in arranging his papers; but before he could finish them for the press, was seized with a violent fever, which carried him to the grave in March 1781. His writings which have been hitherto published consist of a number of curious treatises, of which a list is given in Coxe's Travels, Vol. I. p. 162.

GULA, in anatomy, the œsophagus or gullet; that conduit by which animals take down food into the stomach. See ANATOMY, page 188.

GULE of AUGUST, the day of St. Peter *ad vincula*, which is celebrated on the first of August. It is called the *gule of August*, from the Latin *gula*, "a throat," for this reason, that one Quirinus, a tribune, having a daughter that had a disease in her throat, went to Pope Alexander, the sixth from St. Peter, and desired of him to see the chains that St. Peter was chained with under Nero; which request being granted, and she, kissing the chains, was cured of her disease; whereupon the Pope instituted this feast in honour of St. Peter; and, as before, this day was termed only the calends of August, it was on this occasion called indifferently either the day of St. Peter *ad vincula*, from what wrought the miracle, or the *gule of August*, from that part of the virgin whereon it was wrought.

GULES, in heraldry, a corruption of the French word *gueules*, which in this science signifies "red," and is represented in engraving by perpendicular lines. This colour is by the generality of the English heralds ranked before azure; but French heralds, N. Upton and his followers, prefer azure to it.

GULL, in ichthyology. See LARUS.

GULF, or GULPH, a broad and capacious bay comprehended between two promontories, and sometimes taking the name of a sea when it is very extensive; but particularly when it only communicates with the sea by means of a strait. Such are the Euxine or Black Sea, otherwise called the *Gulf of Constantinople*; the Adriatic Sea, called also the *Gulf of Venice*; the gulf of Sidra near Barbary; and the gulf of Lyons near France. All these gulfs are in the Mediterranean. There are besides, the gulf of Mexico, the gulf of St. Lawrence, and the gulf of California, which are in North America. There are also the gulf of Persia, otherwise called the *Red Sea*, between Persia and Arabia; the gulf of Bengal in India; and the gulfs of Cochinchina and Kamtschatka, near the countries of the same name. The word comes from the French *golfe*, and that from the Italian *golfo*, which signify the same. Some deduce these further from the Greek *γολφός*, which Guishart again derives from the Hebrew *גול* *gob*. Du Cange derives them from the barbarous Latin *gulfum*, or *gulfus*, which signify the same thing.

GULLET. See GULA.

GUM, a concrete vegetable juice, of no particular smell or taste, becoming viscous and tenacious when moistened with water; totally dissolving in water into a liquid, more or less glutinous in proportion to the quantity of the gum; not dissolving in vinous spirits or in oils; burning in the fire to a black coal, without melting or catching flame; suffering no dissipation in the heat of boiling water. The true gums are gum arabic, gum tragacanth, gum senegal, the gum of cherry and plum trees, and such like. All else have more or less of resin in them, and are thence called *gum resins*.

GUM *Arabic* is the produce of a species of *Mimosa*; which see. The medical character of gum arabic is its glutinous quality,

in consequence of which it proves useful in tickling coughs, hoarsenesses, in dysenteries attended with gripes, and where the mucus is abraded from the bowels or from the urethra. In a dysuria the true gum arabic should be preferred to any other of the vegetable gums. One ounce of it renders a pint of water considerably glutinous: four ounces give it a thick syrupy consistence: but for mucilage, one part gum to two parts water is required; and for some purposes, an equal proportion will be necessary. In Dr. Percival's Essays, Vol. I. p. 319, &c. we have a curious account, by Mr. Henry, of the faculty which this gum hath of dissolving and keeping suspended in water, not only resinous but also other substances which should seem not likely to be at all affected by it.

In Mr. Hasselquist's Travels we have an instance of the extraordinary nutritive virtues of gum arabic. "The Abyssinians (says he) make a journey every year to Cairo, to sell the products of their country. They must travel over terrible deserts, and their journey depends as much on the weather as a voyage at sea: consequently they know as little as a seaman how long they must be on their journey; and the necessaries of life may chance to fail them when the journey lasts too long. This happened to the Abyssinian caravan in the year 1740, their provisions being consumed when they had still two months to travel. They were then obliged to search for something among their merchandise wherewith they might support nature; and found nothing more proper than gum arabic, of which they had carried a considerable quantity along with them. This served to support above 1000 persons for two months; and the caravan at last arrived at Cairo without any great loss of people either by hunger or diseases."

Gum Seneca, is a gum extremely resembling gum arabic. It is brought to us from the country through which the river Senega runs, in loose or single drops: but these are much larger than those of the gum arabic usually are; sometimes it is of the bigness of an egg, and sometimes much larger: the surface is very rough or wrinkled, and appears much less bright than the inner substance where the masses are broken. It has no smell, and scarce any taste. It is probably produced from a tree of the same kind with the former. The virtues of it are the same with the gum arabic; but it is rarely used in medicine, unless as mixed with the gum arabic: the dyers and other artificers consume the great quantities of it that are annually imported thither. The negroes dissolve it in milk, and in that state make it a principal ingredient in many of their dishes, and often feed on it thus alone.

The consumption of this article in our manufactories is so considerable, as to make it an object to find any kind of substitute that is cheaper and that will answer the purpose. In the Repertory, Vol. iii. we find the following patent receipt for making a gum, which the inventor recommends under the name of the "*Britannic Elastic Gum*," and which, among a variety of less important uses, is said to be suitable "for painting, pencilling, and staining, silks, calicoes, &c. and in dressing of silk, linen, and cotton, in the loom." The receipt is, linseed or nut-oil, one gallon; bees' wax, one pound; glue or size, six pounds; verdigrise, four ounces; and the same of litharge. These he directs to be put into an iron kettle with two quarts of water, and the whole melted down together. The mode of employing this gum Mr. Angell's patent does not specify.

Another invention is described in the same Work, professing as a "*substitute for gum, in thickening colours for printing*." The patent was granted to Mr. Blakie, of Glasgow, in 1788, and he describes his invention in the following words: "The gum substitute, to thicken colours for linen and calico-printing, and making up or furnishing printers' colour-tubs, and which may also be applied to several other uses, is prepared by boiling any quantity of flax-seed in a sufficient quantity of water,

until the whole substance be extracted thereby; and, having strained it through a linen or woollen cloth, again boil down the liquor to the consistence of a jelly. Put it into a close vessel, and, for preservation, put in a little strong spirits, or pour a little sweet-oil on the top of it; bitters may also be used to preserve it. In using the substitute, the printer may either put a certain quantity into a gallon of colour, according to the nature of it, and the particular kind of work to be done, and regulate himself by trial, as is common in using gum; or reduce the substitute, by boiling in water to the consistence wanted."

GUM *Tragacanth*, the gum of the tragacanth, a thorny bush growing in Crete, Asia, and Greece. See *ASTRAGALUS*.

Other substances known by the name of *gums* are as follow:

GUM *Ammoniac*. See *AMMONIAC*.

GUM *Elemi*. See *AMYRIS*.

GUM *Keno* or *Kino*. See *KENO*.

GUM *Guaiacum*. See *GUAIACUM*.

GUM *Lacca*. See *COCCUS* and *LACCA*.

GUM, among gardeners, denotes a kind of gangrene incident to fruit-trees of the stone kind, in which its viscid juices are made to extravasate and ooze out upon the bark in the form of gum. When this distemper surrounds the branch, it admits of no remedy; but in slighter cases, it is only necessary to remove the decayed parts and apply a coating of tar. See *ORCHARD*.

GUMMA, a sort of venereal excrescence on the periosteum of the bones.

GUMS, in anatomy, the hard fleshy substance in either jaw, through which the teeth pass from the jawbone. The gums are apt to become spongy, and to separate from the teeth; and the cause is frequently a stony tartarous kind of crust, which forms itself there, but which when separated by an operation which the dentists call *scaling*, the gums soon return to their former state. If rubbed daily with a brush composed of very stiff bristles, the tartar will not only be prevented from accumulating, but the gums, from being tender and apt to bleed, will become hard and firm. Cold water is as useful as any other wash, but some choose to join with it one part in four of tincture of myrrh. The scurvy is another disorder which affects the gums; indeed, when a scorbutic disorder invades the whole habit, its first symptom is a putrid state of the gums.

GUN, a fire-arm, or weapon of offence, which forcibly discharges a ball or other matter through a cylindrical tube, by means of inflamed gun-powder.

The word gun now includes most of the species of fire-arms; mortars and pistols being almost the only ones excepted from this denomination. They are divided into great and small guns: the former including all that are usually called cannon, ordnance, or artillery; and the latter includes musquets, firelocks, carabines, musquetoons, blunderbusses, fowling-pieces, &c.

It is not certainly known at what time these weapons were first invented. And though the introduction of guns into the western part of the world is but of modern date, comparatively speaking, yet it is certain that in some parts of Asia they have been used for many ages, though in a very rude and imperfect manner. Philostratus speaks of a city near the river Hyphasis in the Indies, which was said to be impregnable, and that its inhabitants were relations of the gods, because they threw thunder and lightning upon their enemies; and other Greek authors, as also Quintus Curtius, speak of the same thing having happened to Alexander the Great. Hence some have imagined that guns were used by the eastern nations in his time, while others suppose the thunder and lightning alluded to by those authors were only certain artificial fire-works, or rockets,

such as we know are used in the wars by the Indians even in the present day against the Europeans. Be this however as it may, it is asserted by many modern travellers, that guns were used in China as far back as the year of Christ 85, and have continued in use ever since.

The first hint of the invention of guns in Europe is in the works of Roger Bacon, who flourished in the 13th century. In a treatise written by him about the year 1220, he proposes to apply the violent explosive force of gun-powder for the destruction of armies. And though it is certainly known that the composition of gun-powder is described by Bacon in the said work, yet the invention has usually, though improperly, been ascribed to Bartholdas Schwartz, a German monk, who it is said discovered it only in the year 1320; and the accident is related in the following manner. Schwartz having, for some purpose, pounded nitre, sulphur, and charcoal together, in a mortar, which he afterwards covered imperfectly with a stone, a spark of fire accidentally fell into the mortar, which setting the mixture on fire, the explosion blew the stone to a considerable distance. Hence it is probable that Schwartz might be taught the simplest method of applying it in war; for it rather seems that Bacon conceived the manner of using it to be by the violent effort of the flame unconfined, and which is indeed capable of producing astonishing effects. (See GUNPOWDER). And the figure and name of *mortars* given to a species of old artillery, and their employment, in throwing large stone bullets at an elevation, very much favour this conjecture.

Soon after the time of Schwartz, we find guns commonly used as instruments of war. These were originally made of iron-bars folded together, and fortified with strong iron hoops or rings; several of which are still to be seen in the Tower of London, and in the Warren at Woolwich. Others were made of thin sheets of iron rolled up together and hooped: and on particular emergencies some have been made of leather, and of lead, with plates of iron or copper. These first pieces were executed in a rude and imperfect manner, like the first essays of most new inventions. Stone balls were thrown out of them, and a small quantity of powder used on account of their weakness. They were of a cylindrical form, without ornaments, and were placed on their carriages by rings.

When or by whom they were first made is uncertain. It is known however that the Venetians used cannon at the siege of Claudia Jessa, now called Chioggia, in 1366, which were brought thither by two Germans, with some powder and leaden balls; as likewise in their wars with the Genoese in 1379. But before that, king Edward III. made use of cannon at the battle of Cressy in 1346, and at the siege of Calais in 1347. Cannon were employed by the Turks at the siege of Constantinople, then in possession of the Christians, in 1394, and in that of 1452, which threw a weight of 100lb.; but they commonly burst at the 1st, 2d, or 3d firing. Louis XII. had one cast at Tours, of the same size, which threw a ball from the Bastile to Charenton: one of these extraordinary cannon was taken at the siege of Dieu in 1546, by Don John de Castro, and is now in the castle of St. Julian da Barra, 10 miles from Lisbon: the length of it is 20 feet 7 inches, its diameter at the middle 6 feet 3 inches, and it threw a ball of 100lb. weight. It has neither dolphins, rings, nor button; is of an unusual kind of metal; and it has a large Indian inscription upon it, which says it was cast in 1400.

Formerly cannon were dignified with uncommon names. Thus Lewis XII. in 1503 had 12 brass cannon cast, of an extraordinary size, called after the names of the 12 peers of France. The Spanish and Portuguese called them after their saints. The emperor Charles V. when he marched against Tunis, founded the 12 apostles. At Milan there is a 70 pounder, called the Pimontelle; and one at Bois-le-due, called the

Devil. A 60 pounder at Dover-castle, called Queen Elizabeth's pocket pistol. An 80 pounder in the Tower of London, brought there from Edinburgh-castle, called Mount's-meg. An 80 pounder in the royal arsenal at Berlin, called the Thunderer. An 80 pounder at Malaga, called the Terrible. Two curious 60 pounders in the arsenal at Bremen, called the Messenger of bad news. And lastly an uncommon 70 pounder in the castle of St. Angelo at Rome, made of the nails that fastened the copper-plates which covered the ancient Pantheon, with this inscription upon it, *Ex clavis trabalibus porticus Agrippa*. In the beginning of the 15th century these uncommon names were generally abolished, and the following more universal ones took place, viz.

Names.	Wt. of ball,		Wt. of piece	
	Pounders.		in cwt., about	
Cannon royal, or carthoun,	48	-	90	
Bastard cannon, or $\frac{3}{4}$ carthoun,	36	-	79	
Demi-carthoun,	24	-	60	
Whole culverins,	18	-	50	
Demi-culverins,	9	-	30	
Falcon,	6	-	25	
Sacker {	8	-	18	
	largest size	-	6	-
	ordinary	-	6	-
lowest fort	5	-	13	
	48	-	85	
Basilisk	4	-	8	
Serpentine	2	-	7	
Aspic	6	-	12	
Dragon	60	-	81	
Syren	3, 2, and 1	-	15, 10, 5	
Falconet	1	-		
Rabinet	10 or 12 oz.	-		
Moyens		-		

These curious names of beasts and birds of prey were adopted on account of their swiftness in motion, or of their cruelty; as the falconet, falcon, sacker, and culverin, &c. for their swiftness in flying; the basilisk, serpentine, aspic, dragon, syren, &c. for their cruelty. But, at present, cannon take their names from the weight of their proper ball. Thus a piece that discharges a cast-iron ball of 24 pounds is called a 24 pounder; one that carries a ball of 12 pounds is called a 12 pounder; and so of the rest, divided into the following sorts, viz. *Ship-guns*, consisting in 42, 36, 32, 24, 18, 12, 9, 6, and 3 pounders. *Garrison-guns*, in 42, 32, 24, 18, 12, 9, and 6 pounders. *Battering-guns*, in 24, 18, and 12 pounders. *Field-pieces*, in 12, 9, 6, 3, 2, $1\frac{1}{2}$, 1, and $\frac{1}{2}$ pounders.

Mortars, it is thought, have been at least as ancient as cannon. They were employed in the wars of Italy, to throw balls of red-hot iron, stones, &c. long before the invention of shells. These last, it is supposed, were of German invention, and the use of them in war shewn by the following accident: viz. A citizen of Venlo, in war shewn by the following accident: viz. A citizen of Cleves, throwing at a festival celebrated in honour of the duke of Cleves, throwing a number of shells, one of them fell on a house and set it on fire, by which misfortune the greatest part of the town was reduced to ashes. The first account of shells used for military purposes is in 1435, when Naples was besieged by Charles VIII. History informs us, with more certainty, that shells were thrown out of mortars at the siege of Wachtendonk in Guelderland in 1588, by the earl of Mansfield; and Cyprian Lucar wrote upon the method of filling and throwing such shells, in his Appendix to the Colloquies of Tartaglia, printed at London in 1588; where also the compounding and throwing of carcasses and various sorts of fire works are shewn.

Mr. Malter, an English engineer, first taught the French the art of throwing shells, which they practised at the siege of Motte in 1634. The method of throwing red-hot balls out

of mortars was first certainly put in practice at the siege of Stralsund in 1675 by the elector of Brandenburg: though some say in 1653 at the siege of Bremen.

Another species of ordnance has been long in use, by the name of *Howitzer*, which is a kind of medium as to its length between the cannon and the mortar, and is a very useful piece for discharging either shells or large balls, which is done either at point-blance or at a small elevation.

A new species of ordnance was introduced by the Carron company, and thence called a *Carronade*, which is only a very short howitzer, and which seems to possess the advantage of being light and easy to work. They are not, however, found so useful as was expected.

The species of guns before mentioned are now made chiefly of cast iron: except the howitzer, which is of brass, as well as some cannon and mortars.

Muskets were first used at the siege of Rhege in the year 1511. The Spaniards were the first who armed part of their foot with these weapons. At first they were very heavy, and could not be used without a rest. They had match-locks, and did execution at a great distance. On their march the soldiers carried only the rests and ammunition, having boys to bear their muskets after them. They were very slow in loading, not only by reason of the unwieldiness of their pieces, and because they carried the powder and ball separate, but from the time it took to prepare and adjust the match; so that their fire was not near so brisk as ours is now. Afterwards a lighter match-lock musket came in use: and they carried their ammunition in bandeliers, to which were hung several little cases of wood covered with leather, each containing a charge of powder. The muskets with rests were used as late as the beginning of the civil wars in the time of Charles the First. The lighter kind succeeded them, and continued till the beginning of the present century, when they also were disused, and the troops throughout Europe armed with firelocks. These are usually made of hammered iron. For the dimensions, construction, and practice of various species of guns, &c. see the various articles CANNON, MORTAR, HOWITZER, &c. &c. See also GUNNERY.

GUNDELIA, in botany; a genus of the polygamia frégatæ order, belonging to the syngenesia class of plants, and in the natural method ranking under the 49th order, *Compositæ*. There is scarce any calyx but quinqueflorous, with tubular hermaphrodite florets; the receptacle bristly, with scarce any pappus.

GUNELLUS, in ichthyology. See **BLENNIUS**.

GUNNERS, officers of the Tower and other garrisons, whose business it is to manage and look after the ordnance mounted on the lines and batteries, which are all fixed and ready with cartouches and ball for service on the shortest warning. They carry a field-staff, and a large powder-horn in a sling over the left shoulder; in which equipage they march by the guns.

GUNNER, in the artillery, till of late denoted exclusively the second rank of private men in the royal regiment of artillery. The privates were then called the *Matrosses*, a name which is now changed for that of *second Gunner*.

GUNNER of a ship of war, is an officer appointed to take charge of the artillery and ammunition on board; to observe that the former are kept in order, and fitted with tackle and other furniture, and to teach the sailors the exercise of the guns: he is assisted by a mate, &c.

GUNNERA, in botany; a genus of the diandria order, belonging to the gynandria class of plants. The amentum consists of unisporous scales; there is neither calyx nor corolla; the germen is bicarped, with two styles and one seed.

GUNNERY, the art of charging, directing, and exploding all kinds of fire-arms, as cannon, mortars, muskets, &c. to the best advantage. Gunnery is sometimes considered as a part of the military art, and sometimes as a part of pyrotechny. To the art of gunnery too belongs the knowledge of the force and effect of gunpowder, the dimensions of the pieces, and the proportions of the powder and ball they carry, with the methods of managing, charging, pointing, spunging, &c. Also some parts of gunnery are brought under mathematical consideration, which among mathematicians are called absolutely by the name *Gunnery*, viz. the rules and method of computing the range, elevation, quantity of powder, &c. so as to hit a mark or object proposed, and is more particularly called *Projectile*. See **PROJECTILES**.

Long before the invention of gunpowder, and of gunnery properly so called, the art of artillery, or projectiles, was actually in practice. For, not to mention the use of spears, javelins, or stones thrown with the hand, or of bows and arrows, all which are found among the most barbarous and ignorant people, accounts of the larger machines for throwing stones, darts, &c. are recorded by the most ancient writers. Thus one of the kings of Judah, 800 years before the Christian æra, erected engines of war on the towers and bulwarks of Jerusalem, for shooting arrows and great stones for the defence of the city. 2 Chron. xxvi. 15. Such machines were afterwards known among the Greeks and Romans by the names of **BALLISTA**, **CATAPULTA**, &c. which produced effects by the action of a spring of a strongly twisted cordage, formed of tough and elastic animal substances, no less terrible than the artillery of the moderns. Such warlike instruments continued in use down to the 12th and 13th centuries, and the use of bows still longer; nor is it probable that they were totally laid aside till they were superseded by gunpowder and the modern ordnance.

The first application of gunpowder to military affairs, it seems, was made soon after the year 1300, for which the proposal of friar Bacon, about the year 1280, for applying its enormous explosion to the destruction of armies, might give the first hint; and Schwartz, to whom the invention of gunpowder has been erroneously ascribed, on account of the accident mentioned under the article **GUN**, might have been the first who actually applied it in this way, that is, in Europe; for as to Asia, it is probable that the Chinese and Indians had something of the kind many ages before. Thus, only to mention the prohibition of fire-arms in the code of Gentoo laws, printed by the East India Company in 1776, which seems to confirm the suspicion suggested by a passage in Quintus Curtius, that Alexander the Great found some weapons of that kind in India: Cannon in the Shanferit idiom is called *Shet aghnee*, or the weapon that kills a hundred men at once.

However, the first pieces of artillery, which were charged with gunpowder and stone bullets of a prodigious size, were of very clumsy and inconvenient structure and weight. Thus, when Mahomet the Second besieged Constantinople in 1453, he battered the walls with stones of this kind, and with pieces of the calibre of 1200 pounds: which could not be fired more than four times a day. It was however soon discovered that iron bullets, of much less weight than stone ones, would be more efficacious if impelled by greater quantities of stronger powder. This occasioned an alteration in the matter and form of the cannon, which were now cast of brass. These were lighter and more manageable than the former, at the same time that they were stronger in proportion to their bore. This change took place about the close of the fifteenth century.

By this means came first into use such powder as is now employed over all Europe, by varying the proportion of the materials. But this change of the proportion was not the only improvement it received. The practice of graining it is doubtless of considerable advantage. At first the powder had been always used in the form of fine meal, such as it was reduced to by grinding the materials together. And it is doubtful whether the first graining of powder was intended to increase its strength, or only to render it more convenient for filling into small charges and the charging of small arms, to which alone it was applied for many years, whilst meal-powder was still used for cannon. But at last the additional strength which the grained powder was found to possess, doubtless from the free passage of the air between the grains, occasioned the meal-powder to be entirely laid aside.

For the last 200 years, the formation of cannon has been very little improved; the best pieces of modern artillery differing little in their proportion from those used in the time of Charles the Fifth. Indeed lighter and shorter pieces have been often proposed and tried; but though they have their advantages in particular cases, it is agreed they are not sufficient for general service. Yet the size of the pieces has been much decreased; the same purposes being now accomplished by smaller pieces than what were formerly thought necessary. Thus the battering cannon now approved are those that formerly were called demi-cannon, carrying a ball of 24 pounds weight; this weight having been found fully sufficient. The method also of making a breach, by first cutting off the whole wall as low as possible before its upper part is attempted to be beaten down, seems to be a considerable modern improvement in the practical part of gunnery. But the most considerable improvement in the practice is the method of firing with small quantities of powder, and elevating the piece but a little, so that the bullet may just go clear of the parapet of the enemy, and drop into their works, called ricochet firing: for by this means the ball, coming to the ground at a small angle, and with a small velocity, does not bury itself, but bounds or rolls along a great way, destroying all before it. This method was first practised by M. Vauban at the siege of Aeth, in the year 1692. A practice of this kind was successfully practised by the king of Prussia at the battle of Rosbach in 1757. He had several six-inch mortars, made with trunnions, and mounted on travelling carriages, which were fired obliquely on the enemy's lines, and among their horse. These being charged with only 8 ounces of powder, and elevated at one degree and a quarter, did great execution: for these shells rolling along the lines with burning fuses made the stoutest of the enemy not wait for their burling.

The use of fire-arms was however long known before any theory of projectiles was formed. The Italians were the first people that made any attempts at the theory, which they did about the beginning of the 16th century, and amongst them it seems the first who wrote professedly on the flight of cannon shot was Nicholas Tartalia, of Brescia, the same author who had so great a share in the invention of the rules for cubic equations. In 1537 he published at Venice his *Nova Scientia*, and in 1546 his *Questi et Inventioni diversi*, in both which he treats professedly on these motions, as well as in another work, translated into English with additions by Cyprian Lucar, under the title of *Colloquies concerning the Art of Shooting in great and small Pieces of Artillery*, and published at London in 1588. He determined, that the greatest range of a shot was when discharged at an elevation of 45° : and he asserted, contrary to the opinion of his contemporaries, that no part of the path described by a ball is a right line; although the curvature in the first part of it is so small, that it need not be at-

tended to. He compared it to the surface of the sea; which, though it appears to be a plane, is yet doubtless incurvated round the centre of the earth. He says he invented the gunner's quadrant, for laying a piece of ordnance at any point or degree of elevation; and though he had but little opportunity of acquiring any practical knowledge by experiments, he yet gave shrewd guesses at the event of some untried methods.

The philosophers of those times also took part in the questions arising upon this subject; and many disputes on motion were held, especially in Italy, which continued till the time of Galileo, and probably gave rise to his celebrated *Dialogues on Motion*. These were not published till the year 1638; and in the interval there were many theories of the motion of military projectiles, as well as many tables of their comparative ranges, though for the most part very fallacious, and inconsistent with the motion of these bodies.

It is remarkable however that, during these contests, so few of those who were intrusted with the care of artillery thought it worth while to bring their theories to the test of experiment. Mr. Robins informs us, in the preface to his *New Principles of Gunnery*, that he had met with no more than four authors who had treated experimentally on this subject. The first of these is Collado, in 1642, who has given the ranges of a falconet, carrying a three-pound shot, to every point of the gunner's quadrant, each point being the 12th part, or 7° and a half. But from his numbers it is manifest that the piece is not charged with its usual allotment of powder. The result of his trials shews the ranges at the point-blanc, and the several points of elevation, as below.

Collado's Experiments.

Points.	Elevation at	Deg.	Range in
			paces.
0	or	0	- - 268
1	-	$7\frac{1}{2}$	- - 594
2	-	15	- - 794
3	-	$22\frac{1}{2}$	- - 994
4	-	30	- - 1010
5	-	$37\frac{1}{2}$	- - 1040
6	-	45	- - 1053
7	-	$52\frac{1}{2}$	between the 3d and 4th.
8	-	60	between the 2d and 3d
9	-	$67\frac{1}{2}$	between the 1st and 2d
10	-	75	between the 0 and 1st
11	-	$82\frac{1}{2}$	fell very near the piece.

The next was by Wm. Bourne in 1643, in his *Art of Shooting in Great Ordnance*. His elevations were not regulated by the points of the gunner's quadrant, but by degrees; and he gives the proportions between the ranges at different elevations and the extent of the point-blanc shot, thus: If the extent of the point-blanc shot be represented by 1, then the proportions of the ranges at several elevations will be as below, viz.

Bourne's Proportion of Ranges.

Elevation.	Range.
0°	1
5	$2\frac{2}{3}$
10	$3\frac{1}{3}$
15	$4\frac{1}{3}$
20	$4\frac{2}{3}$
and the greatest random $5\frac{1}{2}$;	

which greatest random, he says, in a calm day is at 42° elevation; but according to the strength of the wind, and as it favours or opposes the flight of the shot, the elevation may be from 43° to 36° . He does not say with what piece he made his trials; though from his proportion it seems to have been a small one. This however ought to have been mentioned, as the relation between the extent of different ranges varies extremely according to the velocity and density of the bullet.

After him, Eldred and Anderson, both Englishmen, also published treatises on this subject. The former of these was many years gunner of Dover Castle, where most of his experiments were made, the earliest of which are dated in 1611, though his book was not published till 1646, and was intitled *The Gunner's Glas*. His principles were sufficiently simple, and within certain limits very near the truth, though they were not rigorously so. He has given the actual ranges of different pieces of artillery at small elevations, all under 10 degrees. His experiments are numerous, and appear to be made with great care and caution; and he has honestly set down some, which were not reconcileable to his method: upon the whole he seems to have taken more pains, and to have had a juster knowledge of his business, than is to be found in most of his practical brethren.

Galileo printed his *Dialogues on Motion* in the year 1646. In these he pointed out the general laws observed by nature in the production and composition of motion, and was the first who described the action and effects of gravity on falling bodies: on these principles he determined, that the flight of a cannon-shot, or of any other projectile, would be in the curve of a parabola, unless so far as it should be diverted from that track by the resistance of the air. He also proposed the means of examining the inequalities which arise from thence, and of discovering what sensible effects that resistance would produce in the motion of a bullet at some given distance from the piece.

Notwithstanding these determinations and hints of Galileo, it seems that those who came after him never imagined that it was necessary to consider how far the operations of gunnery were affected by this resistance. Instead of this, they boldly asserted, without making the experiment, that no great variation could arise from the resistance of the air in the flight of shells or cannon-shot. In this persuasion they supported themselves chiefly by considering the extreme rarity of the air, compared with those dense and ponderous bodies; and at last it became an almost generally established maxim, that the flight of these bodies was nearly in the curve of a parabola.

Thus Robert Anderson, in his *Genuine Use and Effects of the Gunne* published in 1674, and again in his book *To hit a Mark* in 1690, relates a great many experiments; but proceeding on the principles of Galileo, he strenuously asserts that the flight of all bullets is in the curve of a parabola; undertaking to answer all objections that could be brought to the contrary. The same thing was also undertaken by Blondel, in his *Art de jeter les Bombes*, published in 1683; where, after long discussion, he concludes, that the variations from the air's resistance are so slight as not to deserve any notice. The same subject is treated of in the *Philos. Trans.* No. 216, p. 68, by Dr. Halley; who also, swayed by the very great disproportion between the density of the air and that of iron or lead, thought it reasonable to believe that the opposition of the air to large metal-shot is scarcely discernible; although in small and light shot he owns that it must be accounted for.

But though this hypothesis went on smoothly in speculation, yet Anderson, who made a great number of trials, found it impossible to support it without some new modification. For though it does not appear that he ever examined the compara-

tive ranges of either cannon or musket shot when fired with their usual velocity, yet his experiments on the ranges of shells thrown with velocities that were but small in comparison of those above mentioned convinced him that their whole track was not parabolical. But instead of making the proper inferences from hence, and concluding that the resistance of the air was of considerable efficacy, he framed a new hypothesis; which was, that the shell or bullet at its first discharge flew to a certain distance in a right line, from the end of which line only it began to describe a parabola: and this right line, which he calls the line of the impulse of the fire, he supposes is the same for all elevations. So that, by assigning a proper length to this line of impulse, it was always in his power to reconcile any two shots made at any two different angles; though the same method could not succeed with three shots; nor indeed does he ever inform us of the event of his experiments when three ranges were tried at one time.

But after the publication of Newton's *Principia*, it might have been expected, that the defects of the theory would be ascribed to their true cause, which is the great resistance of the air to such swift motions; as in that work he particularly considered the subject of such motions, and related the result of experiments, made on slow motions at least; by which it appeared, that in such motions the resistance increases as the square of the velocities, and he even hints a suspicion that it will increase above that law in swifter motions, as is now known to be the case. So far however were those who treated this subject scientifically, from making a proper allowance for the resistance of the atmosphere, that they still neglected it, or rather opposed it, and their theories still differed most egregiously from the truth. Huygens alone seems to have attended to this principle: for in the year 1690 he published a treatise on gravity, in which he gave an account of some experiments tending to prove that the track of all projectiles, moving with very swift motions, was widely different from that of a parabola. The rest of the learned generally acquiesced in the justness and sufficiency of Galileo's doctrine, and accordingly very erroneous calculations concerning the ranges of cannon were given. Nor was any farther notice taken of these errors till the year 1716, at which time Mr. Reffons, a French officer of artillery, of great merit and experience, gave in a memoir to the Royal Academy, importing that, "although it was agreed that theory joined with practice did constitute the perfection of every art; yet experience had taught him that theory was of very little service in the use of mortars: That the works of M. Blondel had justly enough described the several parabolic lines, according to the different degrees of the elevation of the piece; but that practice had convinced him there was no theory in the effect of gunpowder; for having endeavoured, with the greatest precision, to point a mortar according to these calculations, he had never been able to establish any solid foundation upon them." One instance only occurs in which D. Bernoulli applies the doctrine of Newton to the motions of projectiles, in the *Com. Acad. Petrop.* tom. 2, p. 338, &c. Besides which nothing further was done in this business till the time of Mr. Benjamin Robins, who published a treatise in 1742 intitled *New Principles of Gunnery*, in which he treated particularly not only of the resistance of the atmosphere, but also of the force of gunpowder, the nature and effects of different guns, and almost every thing else relating to the flight of military projectiles; and indeed he carried the theory of gunnery nearly to its utmost perfection.

The first thing considered by Mr. Robins, and which is indeed the foundation of all other particulars relating to gunnery, is the explosive force of gunpowder. M. De la Hire, in the *Hist. of the Acad. of Sciences* for the year 1702, supposed that this force may be owing to the increased elasticity

of the air contained in and between the grains, in consequence of the heat and fire produced at the time of the explosion: a cause not adequate to the 200th part of the effect. On the other hand, Mr. Robins determined, by irrefragable experiments, that this force was owing to an elastic fluid, similar to our atmosphere, existing in the powder in an extremely condensed state, which, being suddenly freed from the powder by the combustion, expanded with an amazing force, and violently impelled the bullet, or whatever might oppose its expansion.

The intensity of this force of exploded gunpowder Mr. Robins ascertained in different ways, after the example of Mr. Hawksbee, related in the *Philos. Trans.* No. 295, and in his *Physico-Mechan. Exper.* p. 81. One of these is by firing the powder in the air thus: A small quantity of the powder is placed in the upper part of a glass tube, and the lower part of the tube is immersed in water, the water being made to rise so near the top, that only a small portion of air is left in that part where the powder is placed: then in this situation the communication between the upper part of the tube and the external air being closed, the powder is fired by means of a burning glass, or otherwise; the water descends upon the explosion, and stands lower in the tube than before, by a space proportioned to the quantity of powder fired.

Another way was by firing the powder in vacuo, viz. in an exhausted receiver, by dropping the grains of powder upon a hot iron included in the receiver. By this means a permanent elastic fluid was generated from the fired gunpowder, and the quantity of it was always in proportion to the quantity of powder that was used, as was found by the proportional sinking of the mercurial gage annexed to the air pump. The result of these experiments was, that the weight of the elastic air thus generated was equal to $\frac{3}{18}$ of the compound mass of the gunpowder which yielded it; and that its bulk, when cold and expanded to the rarity of common atmospheric air, was about 240 times the bulk of the powder; and consequently in the same proportion would such fluid at first, if it were cold, exceed the force or elasticity of the atmosphere. But as Mr. Robins found, by another ingenious experiment, that air heated to the extreme degree of the white heat of iron has its elasticity quadrupled, or is 4 times as strong; he thence inferred that the force of the elastic air generated as above, at the moment of the explosion, is at least 4 times 240, or 960, or in round numbers about 1000 times as strong as the elasticity or pressure of the atmosphere on the same space.

Having thus determined the force of the gunpowder, or intensity of the agent by which the projectile is to be urged, Mr. Robins next proceeds to determine the effects it will produce, or the velocity with which it will impel a shot of a given weight from a piece of ordnance of given dimensions; which is a problem strictly limited, and perfectly soluble by mathematical rules, and is in general this: Given the first force, and the law of its variation, to determine the velocity with which it will impel a given body in passing through a given space, which is the length of the bore of the gun.

In the solution of this problem, Mr. Robins assumes these two postulates, viz. 1, That the action of the powder on the bullet ceases as soon as the bullet is out of the piece; and 2d, That all the powder of the charge is fired and converted into elastic fluid before the bullet is sensibly moved from its place: assumptions which, for good reasons, are found to be in many cases very near the truth. It is to be noted also, that the law by which the force of the elastic fluid varies is this, viz. that its intensity is directly as its density, or reciprocally proportional to the space it occupies, being so much the stronger as the space is less: a principle well known, and common to all elastic fluids. Upon these principles then Mr. Robins resolves

this problem, by means of the 39th prop. of Newton's *Principia* in a direct way, and the result is equivalent to this theorem, when the quantities are expressed by algebraic symbols; viz. the velocity of the ball

$$v = 27130 \sqrt{\frac{10a}{cd} \times \log. \frac{b}{a}}$$

$$\text{or} = 100 \sqrt{\frac{223ad^2}{w} \times \log. \frac{b}{a}};$$

where v is the velocity of the ball,

a the length of the charge of powder,

b the whole length of the bore,

c the spec. grav. of the ball, or wt. of a cubic foot, of the same matter in ounces,

d the diam. of the bore,

w the wt. of the ball in ounces.

For example, suppose $a = 2\frac{5}{8}$ inc., $b = 45$ inches, $c = 11345$ oz. for a ball of lead, and $d = \frac{3}{4}$ inches;

then $v = 27130 \sqrt{\frac{7}{2269} \times \log. \frac{120}{7}} = 1674$ feet per second,

the velocity of the ball.

Or, if the wt. of the bullet be $w = 1\frac{9}{16}$ oz. = $\frac{29}{16}$ oz.

Then $v = 100 \sqrt{\frac{1115 \times 189}{29 \times 32} \times \log. \frac{120}{7}} = 1674$ feet, as before.

“ Having in this proposition (says Mr. Robins) shewn how the velocity which any bullet acquires from the force of powder, may be computed upon the principles of the theory laid down in the preceding propositions, we shall next shew, that the actual velocities with which bullets of different magnitudes are impelled from different pieces, with different quantities of powder, are really the same with the velocities assigned by these computations; and consequently that this theory of the force of powder, here delivered, does unquestionably ascertain the true action and modification of this enormous power.

“ But in order to compare the velocities communicated to bullets by the explosion with the velocities resulting from the theory by computation, it is necessary that the actual velocities with which bullets move should be capable of being discovered, which yet is impossible to be done by any methods hitherto made public. The only means hitherto practised by others for that purpose have been either by observing the time of the flight of the shot through a given space, or by measuring the range of the shot at a given elevation, and thence computing on the parabolic hypothesis what velocity would produce this range. The first method labours under this insurmountable difficulty, that the velocities of these bodies are often so swift, and consequently the time observed is so short, that an imperceptible error in that time may occasion an error in the velocity thus found, of 2, 3, 4, 5, or 600 feet in a second. The other method is so fallacious by reason of the resistance of the air (to which inequality the first is also liable), that the velocities thus assigned may not be perhaps the 10th part of the actual velocities fought.

“ To remedy then these inconveniencies, I have invented a new method of finding the real velocities of bullets of all kinds; and this to such a degree of exactness (which may be augmented too at pleasure), that in a bullet moving with the velocity of 1700 feet in 1'', the error in the estimation of it need never amount to its 500th part; and this with-

out any extraordinary nicety in the construction of the machine."

Mr. Robins then gives an account of the machine by which he measures the velocities of the balls, which machine is simply this, viz. a pendulous block of wood suspended freely by a horizontal axis, against which block are to be fired the balls whose velocities are to be determined.

"This instrument thus fitted, if the weight of the pendulum be known, and likewise the respective distances of its centre of gravity and of its centre of oscillation from its axis of suspension, it will thence be known what motion will be communicated to this pendulum by the percussion of a body of a known weight moving with a known degree of celerity, and striking it in a given point; that is, if the pendulum be supposed at rest before the percussion, it will be known what vibration it ought to make in consequence of such a determined blow; and, on the contrary, if the pendulum, being at rest, is struck by a body of a known weight, and the vibration which the pendulum makes after the blow is known, the velocity of the striking body may from thence be determined.

"Hence then, if a bullet of a known weight strikes the pendulum, and the vibration which the pendulum makes in consequence of the stroke be ascertained, the velocity with which the ball moved is thence to be known."

Mr. Robins then explains his method of computing velocities from experiments with this machine; which method is rather troublesome and perplexed, as well as the rules of Euler and Antoni, who followed him in this business; but a much plainer rule is given in Hutton's Tracts, vol. 1, p. 119, where such experiments are explained at full length, and this rule is expressed by either of the two following formulas,

$$v = 5.6727cg \times \frac{p+b}{bir} \sqrt{o} = 614.58cg \times \frac{p+b}{birn}, \text{ the velo-}$$

city; where v denotes the velocity of the ball when it strikes the pendulum, p the weight of the pendulum, b the weight of the ball, c the chord of the arc described by the vibration to the radius r , g the distance below the axis of motion to the centre of gravity, o the distance to the centre of oscillation, i the distance to the point of impact, and n the number of oscillations the pendulum will perform in one minute, when made to oscillate in small arcs. The latter of these two theorems is much the easiest, both because it is free of radicals, and because the value of the radical \sqrt{o} , in the former, is to be first computed from the number n , or number of oscillations the pendulum is observed to make.

With such machines Mr. Robins made a great number of experiments, with musket barrels of different lengths, with balls of various weights, and with different charges or quantities of powder. He has set down the results of 61 of these experiments, which nearly agree with the corresponding velocities as computed by his theory of the force of powder, and which therefore establish that theory on a sure foundation.

From these experiments, as well as from the preceding theory, many important conclusions were deduced by Mr. Robins; and indeed by means of these it is obvious that every thing may be determined relative both to the true theory of projectiles, and to the practice of artillery: for, by firing a piece of ordnance charged in a similar manner against such a ballistic pendulum from different distances, the velocity lost by passing through such spaces of air will be found, and consequently the resistance of the air, the only circumstance that was wanting to complete the theory of gunnery, or military projectiles; and of this kind I have since made a great number of experiments with cannon balls, and have thereby obtained the whole series of resistances to such a ball when moving with every degree of velocity, from 0 up to 2000 feet per second of time. In the struc-

ture of artillery, they may likewise be of the greatest use: for hence may be determined the best lengths of guns; the proportions of the shot and powder to the several lengths; the thickness of a piece, so as it may be able to confine, without bursting, any given charge of powder; as also the effect of wads, chambers, placing of the vent, ramming the powder, &c. For the many other curious circumstances relating to this subject, and the various other improvements in the theory and practice of gunnery made by Mr. Robins, consult the first vol. of his Tracts, collected and published by Dr. Wilson in the year 1761, where ample information may be found.

Soon after the first publication of Robins's New Principles of Gunnery in 1742, the learned in several other nations, treading in his steps, repeated and farther extended the same subject, sometimes varying and enlarging the machinery; particularly Euler in Germany, D'Antoni in Italy, and Messrs. D'Arcy and Le Roy in France. But most of these, like Mr. Robins, with small fire-arms, such as muskets and fusils.

"But (says Dr. Hutton, in his Phil. Dict. p. 556) in the year 1755, in conjunction with several able officers of the Royal Artillery, and other ingenious gentlemen, I undertook a course of experiments with the ballistic pendulum, in which we ventured to extend the machinery to cannon shot of 1, 2, and 3 pounds weight. An account of these experiments was published in the Philos. Trans. for 1778, and for which the Royal Society honoured me with the prize of the gold medal. These were the only experiments that I know of which had been made with cannon balls for this purpose, although the conclusions to be deduced from such are of the greatest importance to those parts of natural philosophy which are dependent on the effects of fired gunpowder; nor do I know of any other practical method of ascertaining the initial velocities within any tolerable degree of the truth. The knowledge of this velocity is of the utmost consequence in gunnery: by means of it, together with the law of the resistance of the medium, every thing is determinable relative to that business; for, besides its being an excellent method of trying the strength of different sorts of powder, it gives us the law relative to the different quantities of powder, to the different weights of shot, and to the different lengths and sizes of guns. Besides these, there does not seem to be any thing wanting to answer any inquiry that can be made concerning the flight and ranges of shot, except the effects arising from the resistance of the medium. In these experiments the weights of the pendulums employed were from 300 to near 600 pounds. In that paper is described the method of constructing the machinery, of finding the centres of gravity and oscillation of the pendulum, and of making the experiments, which are all set down in the form of a journal, with all the minute and concomitant circumstances; as also the investigation of the new and easy rule, set down just above, for computing the velocity of the ball from the experiments. The charges of powder were varied from 2 to 8 ounces, and the shot from 1 to near 3 pounds. And from the whole were clearly deduced these principal inferences, viz.

1. First, That gunpowder fires almost instantaneously.
2. That the velocities communicated to balls or shot, of the same weight, by different quantities of powder, are nearly in the subduplicate ratio of those quantities: a small variation, in defect, taking place when the quantities of powder became great.
3. And when shot of different weights are employed, with the same quantity of powder, the velocities communicated to them are nearly in the reciprocal subduplicate ratio of their weights.
4. So that, universally, shot which are of different weights, and impelled by the firing of different quantities of powder, acquire velocities which are directly as the square roots

of the quantities of powder, and inversely as the square roots of the weights of the shot, nearly. 5. It would therefore be a great improvement in artillery, to make use of shot of a long form, or of heavier matter; for thus the momentum of a shot, when fired with the same weight of powder, would be increased in the ratio of the square root of the weight of the shot. 6. It would also be an improvement to diminish the windage; for by so doing, one-third or more of the quantity of powder might be saved. 7. When the improvements mentioned in the last two articles are considered as both taking place, it is evident that about half the quantity of powder might be saved, which is a very considerable object. But important as this saving may be, it seems to be still exceeded by that of the article of the guns; for thus a small gun may be made to have the effect and execution of another of two or three times its size in the present mode, by discharging a shot of two or three times the weight of its natural ball or round shot. And thus a small ship might discharge shot as heavy as those of the greatest now made use of.

“ Finally, as the above experiments exhibit the regulations with regard to the weights of powder and balls, when fired from the same piece of ordnance, &c.; so by making similar experiments with a gun, varied in its length, by cutting off from it a certain part before each course of experiments, the effects and general rules for the different lengths of guns may be certainly determined by them. In short, the principles on which these experiments were made are so fruitful in consequences, that, in conjunction with the effects resulting from the resistance of the medium, they seem to be sufficient for answering all the enquiries of the speculative philosopher, as well as those of the practical artillerist.”

In the year 1786 was published the first volume of Dr. Hutton's Traacts, in which is detailed, at great length, another very extensive course of experiments which were carried on at Woolwich in the years 1783, 1784, and 1785, by order of the Duke of Richmond, Master General of the Ordnance. The objects of this course were very numerous, but the principal of them were the following:

“ 1. The velocities with which balls are projected by equal charges of powder, from pieces of the same weight and calibre, but of different lengths.

“ 2. The velocities with different charges of powder, the weight and length of the gun being the same.

“ 3. The greatest velocity due to the different lengths of guns, to be obtained by increasing the charge as far as the resistance of the piece is capable of sustaining.

“ 4. The effect of varying the weight of the piece; every thing else being the same.

“ 5. The penetration of balls into blocks of wood.

“ 6. The ranges and times of flight of balls; to compare them with their initial velocities for determining the resistance of the medium.

“ 7. The effect of wads;

of different degrees of ramming;

of different degrees of windage;

of different positions of the vent;

of chambers, and trunnions, and every other circumstance necessary to be known for the improvement of artillery.”

All these objects were obtained in a very perfect and accurate manner; excepting only the article of ranges, which were not quite so regular and uniform as might be wished. The balls too were most of them of one pound weight; but the powder was increased from 1 ounce, up till the bore was quite full; and the pendulum was from 600 to 800 lb. weight. The conclusions from the whole were as follow:

“ 1. That the former law, between the charge and velocity

of ball, is again confirmed, viz. that the velocity is directly as the square root of the weight of powder, as far as to about the charge of 8 ounces: and so it would continue for all charges, were the guns of an indefinite length. But as the length of the charge is increased, and bears a more considerable proportion to the length of the bore, the velocity falls the more short of that proportion.

“ 2. That the velocity of the ball increases with the charge to a certain point, which is peculiar to each gun, where it is greatest; and that by farther increasing the charge, the velocity gradually diminishes, till the bore is quite full of powder. That this charge for the greatest velocity is greater as the gun is longer, but not greater however in so high a proportion as the length of the gun is; so that the part of the bore filled with powder bears a less proportion to the whole in the long guns, than it does in the short ones; the part of the whole which is filled being indeed nearly in the reciprocal subduplicate ratio of the length of the empty part. And the other circumstances are as in this table.

TABLE of Charges producing the greatest Velocity.

Gun. Num.	Length of the bore.	Length filled.	Part of the whole.	Wt. of the powder.
	inches.	inches.		oz.
1	28.2	8.2	$\frac{3}{15}$	12
2	38.1	9.5	$\frac{2}{12}$	14
3	57.4	10.7	$\frac{3}{18}$	16
4	79.9	12.1	$\frac{4}{26}$	18

“ 3. It appears that the velocity continually increases as the gun is longer, though the increase in velocity is but very small in respect of the increase in length, the velocities being in a ratio somewhat less than that of the square roots of the length of the bore, but somewhat greater than that of the cube roots of the length, and is indeed nearly in the middle ratio between the two.

“ 4. The range increases in a much less ratio than the velocity, and indeed is nearly as the square root of the velocity, the gun and elevation being the same. And when this is compared with the property of the velocity and length of gun in the foregoing paragraph, we perceive that very little is gained in the range by a great increase in the length of the gun, the charge being the same. And indeed the range is nearly as the 5th root of the length of the bore; which is so small an increase, as to amount only to about $\frac{1}{7}$ th part more range for a double length of gun.

“ 5. It also appears that the time of the ball's flight is nearly as the range; the gun and elevation being the same.

“ 6. It appears that there is no sensible difference caused in the velocity or range, by varying the weight of the gun, nor by the use of wads, nor by different degrees of ramming, nor by firing the charge of powder in different parts of it.

“ 7. But a great difference in the velocity arises from a small degree of windage. Indeed with the usual established windage only, namely, about $\frac{1}{20}$ th of the calibre, no less than between $\frac{1}{2}$ and $\frac{1}{4}$ of the powder escapes and is lost. And as the balls are often smaller than that size, it frequently happens that half the powder is lost by unnecessary windage.

“ 8. It appears that the resisting force of wood to balls fired into it is not constant. And that the depths penetrated by different velocities or charges are nearly as the logarithms of the charges, instead of being as the charges themselves, or, which is the same thing, as the square of the velocity.

"9. These, and most other experiments, show that balls are greatly deflected from the direction they are projected in; and that so much as 300 or 400 yards in a range of a mile, or almost $\frac{1}{4}$ th of the range, which is nearly a deflection of an angle of 15 degrees.

"10. Finally, these experiments furnish us with the following concomitant data, to a tolerable degree of accuracy, namely, the dimensions and elevation of the gun, the weight and dimensions of the powder and shot, with the range and time of flight, and the first velocity of the ball. From which it is to be hoped, that the measure of the resistance of the air to projectiles may be determined, and thereby lay the foundation for a true and practical system of gunnery, which may be as well useful in service as in theory."

"Since the publication of those Tracts (says Dr. Hutton), we have prosecuted the experiments still farther from year to year, gradually extending our aim to more objects, and enlarging the guns and machinery, till we have arrived at experiments with the 6 pounder guns, and pendulums of 1800 pounds weight. One of the new objects of enquiry was the resistance the atmosphere makes to military projectiles; to obtain which, the guns have been placed at many different distances from the pendulum, against which they are fired, to get the velocity lost in passing through those spaces of air; by which, and the use of the whirling machine, described near the end of the 1st vol. of Robins's Tracts, for the slower motions, I have investigated the resistance of the air to given balls moving with all degrees of velocity, from 0 up to 2000 feet per second; as well as the resistance for many degrees of velocity, to planes and figures of other shapes, and inclined to their path in all varieties of angles; from which I have deduced general laws and formulas for all such motions.

"Mr. Robins made also similar experiments on the resistance of the air; but being only with musket bullets, on account of their smallness, and of their change of figure by the explosion of the powder, I find they are very inaccurate, and considerably different from those above mentioned, which were accurately made with pretty considerable cannon balls, of iron. For this reason we may omit here the rules and theory deduced from them by Mr. Robins, till others more correct shall have been established. All these experiments indeed agree in evincing the very enormous resistance the air makes to the swift motions of military projectiles, amounting in some cases to 20 or 30 times the weight of the ball itself; on which account, the common rules for projectiles, deduced from the parabolic theory, are of little or no use in real practice; for from these experiments it is clearly proved, that the track described by the flight even of the heaviest shot is neither a parabola, nor yet approaching any thing near it, except when they are projected with very small velocities; in so much that some balls, which in the air range only to the distance of one mile, would, *in vacuo*, when projected with the same velocity, range above 10 or 20 times as far." For the common rules of the parabolic theory, see PROJECTILES; and for a small specimen of experiments on resistances, see the 2d vol. of the Edinburgh Philos. Transf.; as also Hutton's Conic Sections and Select Exercises.

Mr. Benjamin Thompson (now Count Rumford) instituted a very considerable course of experiments of the same kind as those of Mr. Robins, with musket barrels, which was published in the Philos. Transf. vol. 71, for the year 1781. In these experiments, the conclusions of Mr. Robins are generally confirmed, and several other curious circumstances in this business are remarked by Mr. Thompson. This gentleman also pursues a hint thrown out by Mr. Robins, relative to the determining the velocity of a ball from the recoil of the pendulous gun itself. Mr. Robins, in prop. 11. remarks, that the effect of the exploded powder upon the recoil of the gun is the same whether the gun is charged with a ball or without one; and that the

chord, or velocity, of recoil with the powder alone, being subtracted from that of the recoil when charged with both powder and ball, leaves the velocity which is due to the ball alone. From thence Mr. Thompson observes, that the inference is obvious, viz. that the momentum thus communicated to the gun by the ball alone, being equal to the momentum of the ball, this becomes known; and therefore being divided by the known weight of the ball, the quotient will be its velocity. Mr. Thompson sets a great value on this new rule, the velocities by means of which he found to agree nearly with several of those deduced from the motion of the pendulum; and in the other cases, in which they differed greatly from these, he very inconsistently supposes that these latter ones are erroneous. In the experiments however contained in Dr. Hutton's Tracts, a great multitude of those cases are compared together, and the inaccuracy of that new rule is fully proved.

Having in the 9th prop. compared together a number of computed and experimented velocities of balls, to verify his theory; Mr. Robins, in the 10th prop. assigns the changes in the force of powder, which arise from the different state of the atmosphere, as to heat and moisture, both which he finds have some effect on it, but especially the latter. In prop. 11. he investigates the velocity which the flame of gunpowder acquires by expanding itself, supposing it fired in a given piece of artillery, without either a bullet or any other body before it. This velocity he finds is upwards of 7000 feet per second. But the celebrated Euler, in his commentary on this part of Mr. Robins's book, thinks it may be still much greater; and in this prop. too it is, that Mr. Robins declares his opinion above alluded to, viz. that the effect of the powder upon the recoil of the gun is the same in all cases, whether fired with a ball or without one. In prop. 12. he ascertains the manner in which the flame of powder impels a ball which is laid at a considerable distance from the charge; showing here that the sudden accumulation and density of the fluid against the ball is the reason that the barrel is so often burst in those cases. In prop. 13. he enumerates the various kinds of powder, and describes the properest methods of examining its goodness. He here shows that the best proportion of the ingredients is when the saltpetre is $\frac{2}{3}$ of the whole compound mass of the powder, and the sulphur and charcoal the other $\frac{1}{3}$ between them, in equal quantities. In this prop. Mr. Robins takes occasion to remark upon the use of eprovettes, or methods of trying powder; condemning the practice of the English in using what is called the vertical eprovette; as well as that of the French, in using a small mortar, with a very large ball, and a small charge of powder: and instead of these, he strongly recommends the use of his ballistic pendulum, for its great accuracy. But for still more dispatch, he says he should use another method, which however he reserves to himself, without giving any particular description of it. From what has been done by Mr. Robins upon this head, several persons have introduced his method of suspending the gun as a pendulum, and noting the quantity of its oscillating recoil when fired with a certain quantity of powder; and of this kind Dr. Hutton has contrived a machine, which possesses several advantages over all others, being extremely simple, accurate, and expeditious; so much so indeed; that the weighing out of the powder is the chief part of the trouble. See GUNPOWDER and POWDER-PROVER.

The other or 2d chapter of Mr. Robins's work, in 8 propositions, treats "of the resistance of the air, and of the track described by the flight of shot and shells." And of these, prop. 1. describes the general principles of the resistance of fluids to solid bodies moving in them. Here Mr. Robins discriminates between continued and compressed fluids, which immediately rush into the space quitted by a body moving in them, and whose parts yield to the impulse of the body without condensing and accumulating before it; and such fluids as are

imperfectly compressed, rushing into a void space, with a limited velocity, as in the case of our atmosphere, which condenses more and more before the ball as this moves quicker, and also presses the less behind it, by following it always with only a given velocity : hence it happens, that the former fluid will resist moving bodies in proportion to the square of the velocity, while the latter resists in a higher proportion. Prop. 2. is "to determine the resistance of the air to projectiles by experiments." One of the methods for this purpose is by the ballistic pendulum, placing the gun at different distances from it, by which he finds the velocity lost in passing through certain spaces of air, and consequently the force of resistance to such velocities as the body moves with in the several parts of its path. And another way was by firing balls, with a known given velocity, over a large piece of water, in which the fall and plunge of the ball could be seen, and consequently the space it passed over in a given time. By these means Mr. Robins determined the resistances of the air to several different velocities, all which showed that there was a gradual increase of the resistance, over the law of the square of the velocity, as the body moved quicker. In the remaining propositions of this chapter, he proceeds a little farther in this subject of the resistance of the air ; in which he lays down a rule for the proportion of the resistance between two assigned velocities ; and he shows, that when a 24 pound ball, fired with its full charge of powder, first issues from the piece, the resistance it meets with from the air is more than 20 times its weight. He farther shows, that "the track described by the flight of shot or shells is neither a parabola, nor nearly a parabola, unless they are projected with small velocities ;" and that "bullets in their flight are not only depressed beneath their original direction by the action of gravity, but are also frequently driven to the right or left of that direction by the action of some other force : and in the 8th or last proposition, he pretends to show that the depths of penetration of balls into firm substances are as the squares of the velocities. But this is a mistake ; for neither does it appear that his trials were sufficiently numerous or various, nor were his small leaden balls fit for this purpose ; and it has appeared, from a number of trials with iron cannon balls, that the penetrations are in a much lower proportion, and that the resisting force of wood is not uniform. See Dr. Hutton's TRACTS.

In the following small tracts, added to the principles, in this volume, Mr. Robins prosecutes the subject of the resistance of the air much farther, and lays down rules for computing ranges made in the air. But these must be far from accurate, as they are founded on the two following principles, which are known, from numerous experiments, to be erroneous : viz. 1st, "That till the velocity of the projectile surpasses that of 1100 feet in a second, the resistance may be esteemed to be in the duplicate proportion of the velocity. 2d, That if the velocity be greater than that of 11 or 1200 feet in a second, then the absolute quantity of that resistance in these greater velocities will be near three times as great as it should be by a comparison with the smaller velocities." For, instead of leaping at once from the law of the square of the velocities, and ever after being about three times as much, experiments prove that the increase of the resistance above the law of the square of the velocity, takes place at first in the smallest motions, and increases gradually more and more, to a certain point, but never rises so high as to be three times that quantity, after which it decreases again. To render this evident, Dr. Hutton has inserted the following table of the actual quantities of resistances, which are deduced from accurate experiments, and which show also the nature of the law of the variations, by means of the columns of differences annexed ; reserving the detail of the experiments themselves to another occasion. These resistances are, upon a ball of 1.965 inc. diameter, in avoirdupois ounces, and are for all velocities from 0 up to that of 2000 feet per second of time.

The quantity of the resistance of the air to a ball of 1.965 inc. diameter.

Veloc. in feet	Resist. in ounces	1st Differences	2d Differences
0	0.000		
5	0.006		
10	0.025		
15	0.054		
20	0.100		
25	0.155		
30	0.23		
40	0.42		
50	0.67		
100	2.4	8.4	
200	11	14	5.4
300	25	20	6
400	45	27	7
500	72	35	8
600	107	44	9
700	151	54	10
800	205	60	12
900	271	79	13
1000	350	92	13
1100	442	104	12
1200	546	115	11
1300	661	124	9
1400	785	131	7
1500	916	135	4
1600	1051	135	0
1700	1186	133	2
1800	1319	128	5
1900	1447	122	6
2000	1569		

The additional tracts of Mr. Robins, in the latter part of this volume, which contain many useful and important matters, are numbered and titled as follows, viz. Number 1, "Of the resistance of the air. Number 2, Of the resistance of the air ; together with the method of computing the motions of bodies projected in that medium. Number 3, An Account of the experiments relating to the resistance of the air, exhibited at different times before the Royal Society, in the year 1746. Number 4, Of the force of fired gunpowder, together with the computation of the velocities thereby communicated to military projectiles. Number 5, A comparison of the experimental ranges of cannon and mortars with the theory contained in the preceding papers. Practical Maxims relating to the effects and management of artillery, and the flight of shells and shot. A proposal for increasing the strength of the British navy, by changing all the guns, from the 18 pounders downwards, into others of equal weight, but of a greater bore." With several letters, and other papers, "On pointing, or the directing of cannon to strike distant objects ; Of the nature and advantage of rifled barrel pieces," &c.

"I have (continues Dr. Hutton) dwelt thus long on Mr. Robins's New Principles of Gunnery, because it is the first work that can be considered as attempting to establish a practical system of gunnery, and projectiles, on good experiments, on the force of gunpowder, on the resistance of the air, and on the effects of different pieces of artillery. Those experiments are however not sufficiently perfect, both on account of the smallness of the bullets, and for want of good ranges, to form a proper theory upon. I have supplied some of the necessary desiderata for this purpose, viz. the resistance of the air to cannon balls moving with all degrees of velocity, and the velocities communicated by given charges of powder to different balls, and from different pieces of artillery. But there are still

wanting good experiments with different pieces of ordnance, giving the ranges and times of flight, with all varieties of charges, and at all different angles of elevation. A few however of those I have obtained, as in the following small table, which are derived from experiments made with a medium one-pounder gun, the iron ball being nearly 2 inches in diameter :

Powder	Elev. of gun	Veloc. of ball	Range	Time of flight
oz	9	feet	feet	"
2	15	860	4100	9
4	15	1230	5100	12
8	15	1640	6000	14½
12	15	1680	6700	15½
2	45	860	5100	21

The celebrated Mr. Euler added many excellent dissertations on the subject of gunnery, in his translation of Robins's Gunnery into the German language ; which were again farther improved in Brown's translation of the same into English, in the year 1777. See also Antoni's *Examen de la Poudre* ; the experiments of MM D'Arcy and Le Roy, in the *Memoirs of the Academy* in 1751 ; and D'Arcy's *Essai d'une theorie d'artillerie* in 1760 : Dr. Hutton's Tracts ; and paper on the force of fired gunpowder in the *Philos. Trans.* for 1778 : and Thompson's paper on the same subject in 1781. Of the common or parabolic theory of gunnery, Mr. Simpson gave a very neat and concise treatise in his *Select Exercises*. For a representation of various implements in GUNNERY, see pl. 2. also the article MORTAR, &c.

GUNPOWDER, a composition of nitre, sulphur, and charcoal, mixed together, and usually granulated. This easily takes fire ; and when fired, it rarefies or expands with great vehemence, by means of its elastic force. It is to this powder that we owe all the effect and action of guns, and ordnance of all sorts. So that fortification, with the modern military art, &c. in a great measure depends upon it. The above definition however is not general ; for, instead of the nitre, it has lately been discovered that the marine acid answers much better.

The invention of gunpowder is ascribed by Polydore Virgil to a chemist ; who having accidentally put some of this composition in a mortar, and covered it with a stone, it happened to take fire, and blew up the stone. Thevet says, that the person here spoken of was a monk of Friburg, named Constantine Anelzen ; but Belleforet, and other authors, with more probability, hold it to be Bartholdus Schwartz, or the Black, who discovered it, as some say, about the year 1320 ; and the first use of it is ascribed to the Venetians, in the year 1380, during the war with the Genoeſe. But there are earlier accounts of its use, after the accident of Schwartz, as well as before it. For Peter Mexia, in his *Various Readings*, mentions that the Moors being besieged in 1343, by Alphonſus the Eleventh, king of Caſtile, diſcharged a kind of iron mortars upon them, which made a noiſe like thunder ; and this is ſeconded by what is related by Don Pedro, biſhop of Leon, in his chronicle of king Alphonſus, who reduced Toledo, viz, that in a ſea-combat between the king of Tunis and the Moorish king of Seville, about that time, thoſe of Tunis had certain iron tubs or barrels, with which they threw thunderbolts of fire. Du-Cange adds, that there is mention made of gunpowder in the regiſters of the chambers of accounts in France as early as the year 1338.

But it appears that Roger Bacon knew of gunpowder near 100 years before Schwartz was born. He tells us, in his *Treatise De Secretis Operibus Artis & Naturæ, & de Nullitate Magiæ*, cap. 6, (which is ſuppoſed by ſome to have been publiſhed at Oxford in 1216, and which was undoubtedly written before his *Opus Majus*, in 1267), “ that from ſaltpetre, and other ingredients, we are able to make a fire that ſhall burn at what diſtance we pleaſe.” And Dr. Plott, in his *History of*

Oxfordſhire, p. 236, aſſures us, that theſe “ other ingredients were explained in a MS. copy of the ſame treatiſe, in the hands of Dr. G. Langbain, and ſeen by Dr. Wallis, to be ſulphur and wood coal.” Farther, in the life of Friar Bacon in the *Biographia Britannica*, vol. 1, we are told that Bacon himſelf has divulged the ſecret of this compoſition in a cipher, by tranſpoſing the letters of the two words in chap. xi. of the ſaid treatiſe ; where it is thus expreſſed : *ſed tamen ſalis petræ LURA MOPE CAN UBRE (i. e. carbonum pulvere) et ſulphuris ; et ſic facies tonitrum & corruſcationem, ſi ſcias artiſcium* : and from hence the biographer apprehends the words *carbonum pulvere* were transferred to the 6th chapter of Langbain's MS. In this ſame chapter, Bacon expreſſly ſays, that ſounds like thunder, and corruſcations, may be formed in the air, much more horrible than thoſe that happen naturally : and farther adds, that there are many ways of doing this, by which a city or an army might be deſtroyed : and he ſuppoſes that by an artiſce of this kind Gideon defeated the Midianites with only 300 men : Judges, chap. 7. There is alſo another paſſage to the ſame purpoſe, in the treatiſe *De Scientia Experimentalis*. See Dr. Jebb's edition of the *Opus Majus*, p. 474.

Mr. Robins, in the preface to his *Gunnery*, apprehends that Bacon deſcribes gunpowder, not as a new compoſition firſt propoſed by himſelf, but as the application of an old one to military purpoſes, and that it was known long before his time.

But Mr. Dutens carries the antiquity of gunpowder ſtill much higher, and refers to the writings of the ancients themſelves for the proof of it. “ Virgil, ſays he, and his commentator Servius (*Æneid*, lib. 6, v. 585), Hyginus (*Fabul.* 61 and 650), Eufthius (ad *Odyſſ.* λ, 234, p. 1682, lib. 1), La Cerda (in *Virgil. loc. cit.*), Valerius Flaccus (lib. i. 662), and many other authors (as Raphael Volatarran, in *Commentar. Cornelius Agrippa poſter. Oper. de Verbo Dei*, c. 100, p. 237. Gruteri *Fax Artium Liberal.* tom. 2, p. 1236), ſpeak in ſuch a manner of Salomoneus's attempts to imitate thunder, as ſuggeſt to us that this prince uſed for that purpoſe a compoſition of the nature of gunpowder. Eufthius in particular ſpeaks of him on this occaſion, as being ſo very expert in mechanics, that he formed machines, which imitated the noiſe of thunder ; and the writers of fable, whoſe ſurpriſe in this reſpect may be compared to that of the Mexicans when they firſt beheld the fire-arms of the Spaniards, give out that Jupiter, incenſed at the audacity of this prince, ſlew him with lightning, as he was employing himſelf in launching his thunder. But it is much more natural to ſuppoſe, that this unfortunate prince, the inventor of gunpowder, gave riſe to theſe fables, by having accidentally fallen a victim to his own experiments. Dion (*Hiſt. Rom. in Caligula*, p. 662), and Joannes Antiochenus, (in *Chronico*, &c. a Valeſio edita, Paris 1631, p. 804), report the very ſame thing of Caligula, aſſuring us that this emperor imitated thunder and lightning by means of certain machines, which at the ſame time emitted ſtones. Themiflius informs us, that the Brachmans encountered one another with thunder and lightning, which they had the art of launching from on high at a conſiderable diſtance ; (Themifl. *Oratio* 27, p. 337). And in another place he relates, that Hercules and Bacchus, attempting to aſſail them in a fort where they were entrenched, were ſo roughly received by reiterated ſtrokes of thunder and lightning, launched upon them from on high by the beſieged, that they were obliged to retire, leaving behind them an everlaſting monument of the raſhneſs of their enterpriſe. Agathias the hiſtorian reports of Anthemius Traleniſis, that having fallen out with his neighbour Zeno the rhetorician, he ſet fire to his houſe with thunder and lightning. It appears from all theſe paſſages, that the effects aſcribed to theſe engines of war, eſpecially thoſe of Caligula, Anthemius, and the Indians, could be only brought about by gunpowder. And what is ſtill more, we find in Julius Africanus a receipt for an ingenious compoſition to be

thrown upon an enemy, which very nearly resembles that powder. But what places this beyond all doubt is a clear and positive passage of an author called Marcus Græcus, whose work in manuscript is in the national library at Paris, intitled *Liber Ignium*. Dr. Mead had the same also in manuscript, and a copy of that is now in Dr. Hutton's hands. The author describes several ways of encountering an enemy, by launching fire upon him; and among others gives the following: "Mix together one pound of live sulphur, two of charcoal of willow, and six of saltpetre; reducing them to a very fine powder in a marble mortar." He adds, "that a certain quantity of this is to be put into a long, narrow, and well-compacted cover, and so discharged into the air. Here we have the description of a rocket. The cover with which thunder is imitated, he represents as short, thick, but half-filled, and strongly bound with packthread; which is exactly the form of a cracker. He then treats of different methods of preparing the match, and how one squib may set fire to another in the air, by having it inclosed within it. In short, he speaks as clearly of the composition and effects of gunpowder, as any person in our times could do. Our inquiries have not yet been able precisely to determine when this author lived, but probably it was before the time of the Arabian physician Mesue, who speaks of him, and who flourished in the beginning of the 9th century. Nay, there is reason to believe that he is the same of whom Galen speaks; in which case he will be of antiquity sufficient to support what I advance." It appears too, from many authors, and many circumstances, that this composition has been known to the Chinese and Indians for thousands of years. See what is said on this head under the article *GUN*.

To this history of gunpowder it may be added, that it has lately been discovered that saltpetre or nitre is not essential to this composition, but that its place may be supplied by other substances; for new gunpowder, of double the strength of the old, has lately been made in France, by the chemists in that country, without any nitre at all; and in 1790 Dr. Hutton tried some of this new powder, that was made at Woolwich, with his eprouvette, when he found it about double the strength of the ordinary sort. This is effected by substituting, instead of the nitre, a like quantity of the marine acid.

But perhaps this new composition may not come into common and general use; both because of the great expence in procuring or making the acid, and of the trouble and danger of preventing it from taking fire by the heat in making it; for it is found to catch fire and explode from a very small degree of heat, and without the aid of a spark.

As to the preparation of gunpowder, there are various compositions of it, with respect to the proportions of the three ingredients, to be met with in pyrotechnical writings; but the process of making it up is much the same in all.

For some time after the invention of artillery, gunpowder was of a much weaker composition than that now in use, or that described by Marcus Græcus; which was chiefly owing to the weakness of their first pieces. See *GUN*. Of 23 different compositions, used at different times, and mentioned by Tartaglia in his *Quest. and Inv. lib. 3, ques. 5*, the first, which was the oldest, contained equal parts of the three ingredients. But when guns of modern structure were introduced, gunpowder of the same composition as the present came also into use. In the time of Tartaglia the cannon powder was made of 4 parts of nitre, one of sulphur, and one of charcoal; and the musket powder of 48 parts of nitre, 7 parts of sulphur, and 8 parts of charcoal; or of 18 parts of nitre, 2 parts of sulphur, and 3 parts of charcoal. But the modern composition is 6 parts of nitre, to one of each of the other two ingredients. Though Mr. Napier says, he finds the strength commonly to be greatest when the proportions are, nitre 3 lb. charcoal about 9 oz. and sulphur about 3 oz. See his paper on gunpowder in the *Trans-*

actions of the Royal Irish Academy, vol. 2. The cannon powder was in meal, and the musket powder grained. And it is certain that the graining of powder, which is a very considerable advantage, is a modern improvement. See the preface to Robins's *Math. Tracts*, p. 32.

To make gunpowder well, regard is to be had to the purity or goodness of the ingredients, as well as to the proportions of them; for the strength of the powder depends much on that circumstance, and also on the due working or mixing of them together.

To purify the nitre, by taking away the fixt or common salt, and earthy part. Dissolve it in a quantity of hot water over the fire; then filtrate it through a flannel bag into an open vessel, and set it aside to cool, and to crystallize. These crystals may in like manner be dissolved and crystallized again; and so on, till they become quite pure and white. Then put the crystals into a dry kettle over a moderate fire, which gradually increase till it begins to smoke, evaporate, lose its humidity, and grow very white: it must be kept continually stirring with a ladle, lest it should return to its former figure, by which its greasiness would be taken away: after that, so much water is to be poured into the kettle as will cover the nitre; and when it is dissolved, and reduced to the consistence of a thick liquor, it must be continually stirred with a ladle till all the moisture is again evaporated, and it be reduced to a dry and white meal.

The like regard is to be had to the sulphur; choosing that which is in large lumps, clear and perfectly yellow; not very hard, nor compact, but porous; nor yet too much shining; and if, when set on fire, it freely burns all away, it is a sign of its goodness: so likewise, if it be pressed between two iron plates that are hot enough to make it run, and in the running it appear yellow, and that which remains of a reddish colour, it is then fit for the purpose. But in case it be foul, it may be purified in this manner: Melt the sulphur in a large iron ladle, or pot, over a very gentle coal fire, well kindled, but not flaming; then scum off all that rises on the top, and swims upon the sulphur; take it presently after from the fire, and strain it through a double linen cloth, letting it pass leisurely; so will it be pure, the gross matter remaining behind in the cloth.

For the charcoal, the third ingredient, such should be chosen as is large, clear, and free from knots, well burnt, and cleaving. The charcoal of light woods is mostly preferred, as of willow, and that of the branches or twigs of a moderate thickness, as of an inch or two in diameter. Dogwood is now much esteemed for this purpose. And a method of charring the wood in a large iron cylinder has lately been recommended, and indeed proved, as yielding better charcoal than formerly. The charcoal not only concurs with the sulphur in supplying the inflammable matter, which causes the detonation of the nitre, but also greatly adds to the explosive power of it by the quantity of elastic vapour expelled during its combustion.

These three ingredients, in their purest state, being procured, long experience has shewn that they are then to be mixed together in the proportion before mentioned, to have the best effect, viz. three-quarters of the composition to be nitre, and the other quarter made up of equal parts of the other two ingredients; or, which is the same thing, 6 parts nitre, 1 part sulphur, and 1 part charcoal.

But it is not the due proportion of the materials only, which is necessary to the making of good powder; another circumstance, not less essential, is the mixing them well together: if this be not effectually done, some parts of the composition will have too much nitre in them, and others too little; and in either case there will be a defect of strength in the powder. On this subject Dr. Hutton refers to Robins, p. 119.

After the materials have been reduced to fine dust, they are mixed together, and moistened with water, or vinegar, or urine,

or spirit of wine, &c. and then beaten together with wooden pebbles for 24 hours, either by hand, or by mills, and afterwards pressed into a hard, firm, and solid cake. When dry, it is grained or corned; which is done by breaking the cake of powder into small pieces, and so running it through a sieve; by which means the grains may have any size given them, according to the nature of the sieve employed, either finer or coarser; and thus also the dust is separated from the grains, and again mixed with other manufacturing powder, or worked up into cakes again.

Powder is smoothed, or *glazed*, as it is called, for small arms, by the following operation: A hollow cylinder or cask is mounted on an axis, turned by a wheel; this cask is half filled with powder, and turned for 6 hours; and thus, by the mutual friction of the grains of powder, it is smoothed, or glazed. The fine mealy part, thus separated or worn off from the rest, is moistened and again granulated.

The Nature, Effects, &c. of Gunpowder.—When the powder is prepared as above, if the least spark be struck upon it from a steel and flint, the whole will immediately inflame, and burst out with extreme violence. This effect is not hard to account for: the charcoal part of the grain upon which the spark falls, catching fire like tinder, the sulphur and nitre are readily melted, and the former also breaks into flame; the contiguous grains at the same time undergoing the same change.

Sir Isaac Newton reasons thus upon the point: The charcoal and sulphur in gunpowder easily take fire, and kindle the nitre; and the spirit of the nitre, being thereby rarefied into vapour, rushes out with an explosion much after the manner that the vapour of water rushes out of an eolipile; the sulphur also, being volatile, is converted into vapour, and augments the explosion: add, that the acid vapour of the sulphur, namely that which distils under a bell into oil of sulphur, entering violently into the fixt body of the nitre, lets loose the spirit of the nitre, and excites a greater fermentation, by which the heat is farther augmented, and the fixt body of the nitre is also rarefied into fume; and the explosion is thereby made more vehement and quick. For if salt of tartar be mixed with gunpowder, and that mixture be warmed till it takes fire, the explosion will be far more violent and quick than that of gunpowder alone; which cannot proceed from any other cause than the action of the vapour of the gunpowder upon the salt of tartar, by which that salt is rarefied.

The explosion of gunpowder therefore arises from the violent action, by which all the mixture, being quickly and vehemently heated, is rarefied and converted into fume and vapour; which vapour, by the violence of that action becoming so hot as to shine, appears in the form of a flame.

M. De la Hire, in the History of the French Academy for 1702, ascribes all the force and effect of gunpowder to the spring or elasticity of the air inclosed in the several grains of it, and in the intervals or spaces between the grains: the powder being kindled, sets the springs of so many little parcels of air a-playing, and dilates them all at once, whence the effect; the powder itself only serving to light a fire which may put the air in action; after which the whole is done by the air alone.

But it appears from the experiments and observations of Mr. Robins, that if this air be in its natural state at the time when the powder is fired, the greatest addition its elasticity could acquire from the flame of the explosion, would not amount to five times its usual quantity, and therefore could not suffice for the 200th part of the effort which is exerted by fired powder.

To understand the force of gunpowder, it must be considered that, whether it be fired in a vacuum or in air, it produces by its explosion a permanently elastic fluid. See *Philos. Transf.*

number 295; also Hauksbee's *Phys. Mech. Exp.* p. 81. It also appears from experiment, that the elasticity or pressure of the fluid produced by the firing of gunpowder, is, *ceteris paribus*, directly as its density.

To determine the elasticity and quantity of this elastic fluid, produced from the explosion of a given quantity of gunpowder, Mr. Robins premises, that the elasticity of this fluid increases by heat, and diminishes by cold, in the same manner as that of the air; and that the density of this fluid, and consequently its weight, is the same with the weight of an equal bulk of air, having the same elasticity and the same temperature. From these principles, and from the experiments by which they are established (for a detail of which we must refer to the book itself, so often cited in these articles), he concludes, that the fluid produced by the firing of gunpowder is nearly $\frac{3}{5}$ of the weight of the generating powder itself; and that the volume or bulk of this air or fluid, when expanded to the rarity of common atmospheric air, is about 244 times the bulk of the said generating powder.—Count Saluce, in his *Miscel. Phil. Mathem. Soc. Priv. Taurin.* p. 125, makes the proportion as 222 to 1; which he says agrees with the computation of Messrs. Hauksbee, Amontons, and Belidor.

Hence it appears, that any quantity of powder fired in any confined space, which it adequately fills, exerts, at the instant of its explosion against the sides of the vessel containing it, and the bodies it impels before it, a force at least 244 times greater than the elasticity of common air, or, which is the same thing, than the pressure of the atmosphere; and this without considering the great addition arising from the violent degree of heat with which it is endued at that time; the quantity of which augmentation is the next head of Mr. Robins's enquiry. He determines, that the elasticity of the air is augmented in a proportion somewhat greater than that of 4 to 1, when heated to the extreme heat of red hot iron; and supposing that the flame of fired gunpowder is not of a less degree of heat, increasing the former number a little more than 4 times, makes nearly 1000; which shews that the elasticity of the flame, at the moment of explosion, is about 1000 times stronger than the elasticity of common air, or than the pressure of the atmosphere. But, from the height of the barometer, it is known that the pressure of the atmosphere upon every square inch, is on a medium 14 $\frac{3}{4}$ lb.; and therefore 1000 times this, or 14750 lb. is the force or pressure of the flame of gunpowder, at the moment of explosion, upon a square inch, which is very nearly equivalent to 6 tons and a half. This great force however diminishes as the fluid dilates itself, and in that proportion, viz. in proportion to the space it occupies, it being only half the strength when it occupies a double space, one third the strength when triple the space, and so on.

Mr. Robins farther supposes the degree of heat above mentioned to be a kind of medium heat; but that in the case of large quantities of powder the heat will be higher, and in very small quantities lower; and that therefore in the former case the force will be somewhat more, and in the latter somewhat less, than 1000 times the force of the atmosphere.

He farther found that the strength of powder is the same in all variations in the density of the atmosphere. But that the moisture of the air has a great effect upon it; for the same quantity which in a dry season would discharge a bullet with a velocity of 1700 feet in one second, will not in damp weather give it a velocity of more than 12 or 1300 feet in a second, or even less, if the powder be bad, and negligently kept. See Robins's *Tracts*, vol. 1. p. 101, &c. Farther, as there is a certain quantity of water, which, when mixed with powder, will prevent its firing at all, it cannot be doubted but every degree of moisture must abate the violence of the explosion; and hence the effects of damp powder are not difficult to account for.

It is to be observed, that the moisture imbibed by powder does not render it less active when dried again. Indeed, if powder be exposed to very great damps without any caution, or when common salt abounds in it, as often happens through negligence in refining the nitre, in such cases the moisture it imbibes may perhaps be sufficient to dissolve some part of the nitre: which is a permanent damage that no drying can retrieve. But when tolerable care is taken in preserving powder, and the nitre it is composed of has been well purged from common salt, it will retain its force for a long time; and it is said that powder has been known to have been preserved for 50 years without any apparent damage from its age.

The velocity of expansion of the flame of gunpowder, when fired in a piece of artillery, without either bullet or other body before it, is prodigiously great, viz. 7000 feet per second, or upwards, as appears from the experiments of Mr. Robins. But Mr. Bernoulli and Mr. Euler suspect it is still much greater. And Dr. Hutton suspects it may not be less, at the moment of explosion, than 4 times as much.

It is this prodigious celerity of expansion of the flame of fired gunpowder which is its peculiar excellence, and the circumstance in which it so eminently surpasses all other inventions, either ancient or modern: for as to the momentum of these projectiles only, many of the warlike machines of the ancients produced this in a degree far surpassing that of our heaviest cannon shot or shells; but the great celerity given to these bodies cannot be in the least approached by any other means than the explosion of powder.

To prove Gunpowder. There are several ways of doing this. 1. By sight: thus, if it be too black, it is a sign that it is moist, or else that it has too much charcoal in it; so also if rubbed upon white paper, it blackens it more than good powder does: but if it be of a kind of azure colour, somewhat inclining to red, it is a sign of good powder. 2. By touching: for if in crushing it with the fingers ends, the grains break easily, and turn into dust, without feeling hard, it has too much coal in it; or if, in pressing it under the fingers upon a smooth hard board, some grains feel harder than the rest, it is a sign the sulphur is not well mixed with the nitre. Also, by thrusting the hand into a parcel of powder, and grasping it, as if to take out a handful, you will feel if it is dry and equally grained, by its evading the grasp, and running softly out of the hand. 3. By burning; and here the method most commonly followed for this purpose with us, says Mr. Robins, is to fire a small heap of it on a clean board, and to attend nicely to the flame and smoke it produces, and to the marks it leaves behind on the board: but besides this uncertain method, there are other contrivances made use of, such as powder-tryers acting by a spring, commonly sold at the shops, and others again that move a great weight, throwing it upwards, which is a very bad sort of epreuve. But these machines, says Mr. Robins, though more perfect than the common powder-tryers, are yet liable to great irregularities; for as they are all moved by the instantaneous stroke of the flame, and not by its continued pressure, they do not determine the force of the fired powder with sufficient certainty and uniformity. Another method is to judge from the range given to a large solid ball, thrown from a very short mortar, charged with a small quantity of powder; which is also an uncertain way, both on account of the great disproportion between the weight of the ball and powder, and the unequal resistance of the air; not to mention that it is too tedious to prove large quantities of powder in this way; for, "if each barrel of powder was to be proved in this manner, the trouble of charging the mortar, and bringing back the ball each time, would be intolerable, and the delay so great, that no business of this kind could ever be finished; and if a number of barrels are received on the merit of a few, it is great odds but some

bad ones would be amongst them, which may prove a great disappointment in time of service." These exceptions do "no-ways hold, continues Mr. Robins, against the method by which I have tried the comparative strength of different kinds of powder, which has been by the actual velocity given to a bullet, by such a quantity of powder as is usually esteemed a proper charge for the piece: and as this velocity, however great, is easily discovered by the motion which the pendulum acquires from the stroke of the bullet, it might seem a good amendment to the method used by the French (viz. that of the small mortar above mentioned) to introduce this trial by the pendulum instead of it. But though I am satisfied, that this would be much more accurate, less laborious, and readier than the other, yet, as there is some little attention and caution required in this practice, which might render it of less dispatch than might be convenient, when a great number of barrels were to be separately tried, I should myself choose to practise another method not less certain, but prodigiously more expeditious; so that I could engage, that the weighing out of a small parcel of powder from each barrel should be the greatest part of the labour; and, doubtless, three or four hands could, by this means, examine 500 barrels in a morning: besides, the machines for this purpose, as they might be made of cast iron, would be so very cheap, that they might be multiplied at pleasure." Robins, page 123. It is not certainly known what might be the particular construction of the epreuve here hinted at, but it was probably a piece of ordnance suspended like a pendulum, as he had made several experiments with a barrel in that manner. Be this however as it may, several persons, from those ideas and experiments of Mr. Robins, have made epreuves on this principle, which seems to be the best of any; and on this idea also Dr. Hutton has lately made a machine for this purpose, which has several peculiar contrivances, and advantages over all others, both in the nature of its motion, and the divisions on its arc, &c. It is a small cannon, the bore of which is about one inch in diameter, and is usually charged with 2 ounces of powder, and with powder only, as a ball is not necessary, and the strength of the powder is accurately shewn by the arc of the gun's recoil. The whole machine is so simple, easy, and expeditious, that, as Mr. Robins observed above, the weighing of the powder is the chief part of the trouble; and so accurate and uniform, that the successive repetitions or firings with the same quantity of the same sort of powder, hardly ever yield a difference in the recoil of the 100th part of itself.

To recover damaged Powder. The method used by the powder merchants is this: They put part of the powder on a sail-cloth, to which they add an equal weight of what is really good; then with a shovel they mingle it well together, dry it in the sun, and barrel it up, keeping it in a dry and proper place.

Others again, if it be very bad, restore it by moistening it with vinegar, water, urine, or brandy; then they beat it fine, sift it, and to every pound of powder add an ounce, or an ounce and a half, or two ounces (according as it is decayed), of melted nitre; and afterwards these ingredients are to be moistened and well mixed, so that nothing may be discerned in the composition; which may be known by cutting the mass, and then they granulate it as usual. In case the powder be quite spoiled, the only way is to extract the saltpetre with water, in the usual way, by boiling, filtering, evaporating, and crystallizing: and then, with fresh sulphur and charcoal, to make it up again. On the subject of gunpowder, see Euler on Robins's Gunnery, Antoni Examen de la Poudre, Baume's Chemistry, and Thompson's Experiments in the Philos. Trans. for 1781.

According to Boerhaave, gunpowder affords a vapour capable of resisting the plague and other contagious diseases. It is also reckoned of service as a topic in cutaneous diseases.

It is enacted by 5 and 11 of Geo. I. and 5 Geo. II. c. 20. that gunpowder be carried to any place in a covered carriage; the barrels being close-jointed; or in casks and bags of leather, &c. And persons keeping more than 200 pounds weight of gunpowder at one time, within the cities of London and Westminster, or the suburbs, &c. are liable to forfeitures if it be not removed; and justices of peace may issue warrants to search for, seize, and remove the same.

GUN-Shot Wounds. See SURGERY.

GUN-Smith, a maker of small fire-arms, as muskets, fowling-pieces, pistols, &c.

GUN-Smithery, the business of a gun-smith, or the art of making fire-arms of the smaller sort, as muskets, fowling-pieces, pistols, &c. The principal part of these instruments is the barrel, which ought to have the following properties. 1. Lightness, that it may incommode the person who carries it as little as possible. 2. Sufficient strength and other properties requisite to prevent its bursting by a discharge. 3. It ought to be constructed in such a manner as not to recoil with violence. And, 4. it ought to be of sufficient length to carry the shot to as great a distance as the force of the powder employed is capable of doing.

The manufacture of fire-arms is now carried to such a degree of perfection by different European nations, that it may perhaps be justly doubted whether any farther improvement in the requisites just mentioned can be made. For the materials, the softest iron that can be procured is to be made use of. The best in this country are formed of *flubs*, as they are called, or old horse-shoe nails; which are procured by the gun-smiths from farriers, and from poor people who subsist by picking them up on the great roads leading to London. These are sold at about 10s. per cwt. and 28 pounds are requisite to form a single musket barrel. The method of manufacturing them from this material is as follows: A hoop of about an inch broad, and six or seven inches diameter, is placed in a perpendicular situation, and the flubs, previously well cleaned, piled up in it with their heads outermost on each side, till the hoop is quite filled and wedged tight with them. The whole then resembles a rough circular cake of iron; which being heated to a white heat, and then strongly hammered, coalesces into one solid lump. The hoop is now removed, and the heatings and hammerings repeated till the iron is rendered very tough and close in the grain; when it is drawn out into pieces of about 24 inches in length, half an inch or more in breadth, and half an inch in thickness.

Four of these pieces are employed for one barrel; but in the ordinary way a single bar of the best soft iron is employed. The workmen begin with hammering out this into the form of a flat ruler, having its length and breadth proportioned to the dimensions of the intended barrel. By repeated heating and hammering this plate is turned round a tempered iron rod called a *mandril*, the diameter of which is considerably smaller than the intended bore of the barrel. One of the edges of the plate being laid over the other about half an inch, the whole is heated and welded by two or three inches at a time, hammering it briskly, but with moderate strokes, upon an anvil which has a number of semicircular furrows in it, adapted to barrels of different sizes. Every time the barrel is withdrawn from the fire, the workman strikes it gently against the anvil once or twice in an horizontal direction. By this operation the particles of the metal are more perfectly consolidated, and every appearance of a seam in the barrel is obliterated. The mandril being then again introduced into the cavity of the barrel, the latter is very strongly hammered upon it in one of the semicircular hollows of the anvil, by small portions at a time; the heatings and hammerings being repeated until the whole barrel has undergone the operation, and its parts rendered as

perfectly continuous as if they had been formed out of a single piece. To effect this completely, three welding heats are necessary when the very best iron is made use of, and a greater number for the coarser kinds. The French workmen imagine, that by giving the barrel, while in the fire, slight horizontal strokes with the hammer, so as to communicate a vibratory motion to the iron, those particles are thrown off which are in a state of fusion and cannot easily be converted into malleable iron: but considering the great number of operations already described which the metal has undergone, we can scarce suppose this to be of much consequence.

The next operation in forming the barrels is the boring of them, which is done in the following manner: Two beams of oak, each about six inches in diameter, and six or seven feet long, are placed horizontally and parallel to one another: having each of their extremities mortised upon a strong upright piece about three feet high, and firmly fixed. A space of three or four inches is left between the horizontal pieces, in which a piece of wood is made to slide by having at either end a tenon let into a groove which runs on the inside of each beam throughout its whole length. Through this sliding piece a strong pin or bolt of iron is driven or screwed in a perpendicular direction, having at its upper end a round hole large enough to admit the breach of the barrel, which is secured in it by means of a piece of iron that serves as a wedge, and a vertical screw passing through the upper part of the hole. A chain is fastened to a staple in one side of the sliding piece which runs between the two horizontal beams; and passing over a pulley at one end of the machine, has a weight hooked on to it. An upright piece of timber is fixed above this pulley and between the ends of the beams, having its upper end perforated by the axis of an iron crank furnished with a square socket; the other axis being supported by the wall, or by a strong post, and loaded with a heavy wheel of cast iron to give it force. The axes of this crank are in a line with the hole in the bolt already mentioned.—The borer being then fixed into the socket of the crank, has its other end, previously well oiled, introduced into the barrel, whose breech part is made fast in the hole of the bolt: the chain is then carried over the pulley, and the weight hooked on; the crank being then turned with the hand, the barrel advances as the borer cuts its way, till it has passed through the whole length.—The boring bit consists of an iron rod somewhat longer than the barrel, one end of which fits the socket of the crank; the other is adapted to a cylindrical piece of tempered steel about an inch and a half in length, having its surface cut after the manner of a perpetual screw, with five or six threads, the obliquity of which is very small. The breadth of the furrows is the same with that of the threads, and their depth sufficient to let the metal cut by the threads pass through them easily. Thus the bit gets a strong hold of the metal; and the threads, being sharp at the edges, scoop out and remove all the inequalities and roughness from the inside of the barrel, and render the cavity smooth and equal throughout. A number of bits, each a little larger than the former, are afterwards successively passed through the barrel in the same way, until the bore has acquired the magnitude intended. By this operation the barrel is very much heated, especially the first time the borer is passed through it, by which means it is apt to warp. To prevent this in some measure, the barrel is covered with a cloth kept constantly wetted, which not only preserves the barrel from an excess of heat, but likewise preserves the temper of the bit from being destroyed. The borer itself must also be withdrawn from time to time; both to clean it from the shavings of the metal and to oil it, or repair any damages it may have sustained. Every time a fresh bit has been passed through the barrel, the latter must be carefully examined, to see if it has warped; and likewise if there are any spots, by the work-

men called *blacks*, on its inside. When warped, it must be straightened on the anvil; for which a few slight strokes on the convex parts will be sufficient; and this is termed *setting up* the barrel. When black spots are perceived, the corresponding part on the outside must be marked, and driven in by gentle strokes with the hammer, when they will be completely removed by passing the borer another time through the piece.

The equality of the bore is of the utmost consequence to the perfection of a barrel; inasmuch that the greatest possible accuracy in every other respect will not make amends for any deficiency in this respect. The method used by gunsmiths to ascertain this is by a cylindrical plug of tempered steel highly polished, about an inch in length, and fitting the bore exactly. This is screwed upon the end of an iron rod, and introduced into the cavity of the barrel, where it is moved backwards and forwards; and the places where it passes with difficulty being marked, the boring bit is repeatedly passed until it moves with equal ease through every part. Any person who wishes to know the merit of his piece in this respect, may do it with tolerable accuracy by means of a plug of lead cast on a rod of iron; or even by a musket ball filed exactly to the bore, and pushed through the barrel by a ramrod; taking care, however, not to use much force lest the ball be flattened, and its passage thus rendered difficult.

The last step towards the perfection of the inside of the barrel is termed *fine boring*; by which is meant the smoothing it in such a manner as to remove all marks and inequalities left by the borer. The fine-borer resembles the other in its general construction; but instead of the piece of steel cut in form of a screw which belongs to that, it is furnished with a square broach 10 or 12 inches long, highly polished, and very sharp, by which means it cuts the metal very smoothly. It is found to answer the purpose best when only two of its edges are allowed to work; the other two are covered with slips of oiled paper, one or more additional slips being put on each time that the instrument is passed through the barrel. The fine-borer is frequently passed through, from the muzzle to the breech, and from the breech to the muzzle, until the whole inside presents a perfectly equal and polished surface; the barrel being likewise examined and set up, if requisite, after each time. It is absolutely necessary that this instrument should be perfectly true, and not in the least cast or warped in the tempering.

Besides the operations above described, another, called *polishing*, is usually performed on gun-barrels, though it is doubtful whether this last be attended with any good effect or not. It is performed by a cylinder of lead, five or six inches long, cast upon a rod of iron, and filed exactly to the bore. The lead being then covered with very fine emery and oil, is wrought backwards and forwards through the whole length of the barrel, until the inside has acquired the requisite degree of polish. The disadvantages of this operation are, that it is scarce possible to perform it without pressing more upon one part than another, and thus producing some degree of inequality on the inside, which is of the very worst consequence to fire-arms. The polish thus given is likewise very perishable; so that the fine-boring may justly be considered as the last operation necessary for the inside of a barrel; and it is then proper to give the external form and proportions by means of a file. For this purpose, four faces are first formed upon it, then eight, then 16; and so on till it be quite round, excepting the part next the breech, called the *reinforced part*, which is always left of an octagonal form. It being absolutely necessary that the barrel should be equally thick on every side, gunsmiths employ, for accomplishing this purpose, a particular tool named a *compass*. This consists of an iron-rod bent in such a manner as to form two parallel branches about an inch distant from one another. One of these branches is introduced into the barrel,

and kept closely applied to the side, by means of one or more springs with which it is furnished; the other descends parallel to this on the outside, and has several screws passing through it with their points directed to the barrel. By screwing these until their points touch the surface of the barrel, and then turning the instrument round within the bore, we perceive where the metal is too thick, and how much it must be reduced, in order to render every part perfectly equal throughout its circumference. It may be made long enough to reach the whole length of the barrel, though it will be more convenient to have it only half as much, and to introduce it first at one end and then at the other. Instead of rounding the barrel by means of a file and compass, however, some people do so by turning it in a lathe; which is no doubt more expeditious, though neither so certain nor exact. A spindle as long as a gun-barrel cannot, without great difficulty, be prevented from springing considerably under the tool employed to reduce or smooth it in turning; whence it is found, that by this operation barrels are more frequently warped than by all the borings they undergo; and there is now this farther inconvenience, that they cannot be set up as formerly, without danger of destroying them entirely.

The barrels being thus bored and formed externally, it is customary with the gunsmiths in France to folder on the loops and aim before they breech the barrel. The English, however, do not restrict themselves in this manner: for as soft folder is sufficient for fastening on these, they never use any other; while the French, who use hard folder, must of consequence employ a great heat. Thus the inside is roughened sometimes so considerably, that it is necessary to repeat the fine boring; which could not be done without injuring the threads of the screw formed for the breech, if the barrel were prepared for the latter without foldering on the former.

The first tool employed in forming the breech-screw is a plug of tempered steel, somewhat conical, with the threads of a male screw upon its surface, and by the workman termed a *screw tap*. This being introduced into the barrel, and worked from left to right and back again, until it has marked out the four first threads of the screw, another less conical tap is introduced; and when this has carried the impression of the screw as far as it is intended to go, a third one, nearly cylindrical, is made use of, scarcely differing from the plug of the breech intended to fill the screw thus formed in the barrel. The plug itself has its screw formed by means of a screw-plate of tempered steel, with several female screws, corresponding with the taps employed for forming that in the barrel. Seven or eight threads are a sufficient length for a plug: they ought to be neat and sharp, so as completely to fill the turns made in the barrel by the tap. The breech-plug is then to be case-hardened, or to have its surface converted into steel, by covering it with shavings of horn, or the parings of the hoofs of horses, and keeping it for some time red hot; after which it is plunged in cold water.

The only thing now requisite for completing the barrels is to give them a proper colour; as a preparation for which their outside is first to be neatly polished with oil and emery. This being done, it was formerly the custom to give such a degree of heat as would make them blue throughout; but as this cannot be effected without a partial calcination of the surface, which of consequence affects the inside also, the blue colour has been for some time disused, and a brown one substituted in its place. To give this colour, the pieces are first rubbed over with aquafortis or spirit of salt diluted with water; after which they are laid by till a complete coat of rust is formed upon them: a little oil is then applied; and the surface being rubbed dry, is polished by means of a hard brush and bees-wax.

Thus the common musket-barrels for the purposes especially of sportsmanship are made; but there are some other methods

of manufacture, by which the barrels are made to differ in some respects from those just described, and are thought to be considerably improved. One kind of these are called *twisted barrels*; and by the English workmen are formed out of the plates made of *stubs* as above described. Four of these, of the size already mentioned, are requisite to make one barrel. One of them heated red hot for five or six inches is turned like a cork-screw by means of the hammer and anvil; the remaining parts being treated successively in the same manner until the whole is turned into a spiral, forming a tube, the diameter of which corresponds with the bore of the intended barrel. Four are generally sufficient to form a barrel of the ordinary length, *i. e.* from 32 to 38 inches; and the two which form the breech or strongest part, called the *reinforced part*, are considerably thicker than those which form the muzzle or fore part of the barrel. One of these tubes is then welded to a part of an old barrel to serve as an handle; after which the turns of the spiral are united by heating the tube two or three inches at a time to a bright white heat, and striking the end of it several times against the anvil in a horizontal direction with considerable strength, which is called *jumping the barrel*; and the heats given for this purpose are called *jumping heats*. The next step is to introduce a mandril into the cavity, and to hammer the heated portion lightly in order to flatten the ridges or burrs raised by the jumping at the place where the spirals are joined. As soon as one piece is jumped throughout its whole length, another is welded to it, and treated in the same manner, until the four pieces are united, when the part of the old barrel is cut off, as being no longer of any use. The welding is repeated three times at least, and is performed exactly in the same manner as directed for plain barrels; and the piece may afterwards be finished according to the directions already given.

The operation for the French twisted barrels is very different from that just mentioned, and much more exceptionable. It consists in heating the barrel by a few inches at a time to a strong red heat; one end is then screwed into a vice, and a square piece of iron with an handle like an augre is introduced into the other. By means of these the fibres of the heated portion are twisted into a spiral direction, which is supposed to resist the effort of the inflamed powder better than the other. To render this operation complete, however, it must be observed, that when once the several portions of the barrel have been twisted, the subsequent heats ought not to be very great, or the grain of the metal will regain its former state, and the barrel be no better for the twisting than before. To twist a barrel in this manner, also, it will be necessary to forge it at least half a foot longer than it is intended to be, that a sufficient length may be kept cold at each end to give a sufficient purchase to the vice and twisting instrument; and these portions must afterwards be cut off before the barrel is bored, or two pieces of an old barrel may be welded to the muzzle and breech of that which is to be twisted, and cut off when the operation is over. These pieces may also be made stronger than usual to resist the force of the vice and twisting instrument; and in order to give the latter a firmer hold, the cavity of the muzzle may be made of a square form. The English workmen are unanimously of opinion that this method of twisting is really injurious to the barrel, by straining the fibres of the metal. At any rate, from the injudicious methods followed by the French artists, the greatest part of their barrels, said to be twisted, are not so in reality; there being at least six or seven inches at the muzzle, and seven or eight at the breech, which are not affected by the operation.

The French *ribbon barrels* have a great resemblance to the English twisted ones; but the process for making them is much more operose, though it seems not to possess any real advantage over that used by the English gun-smiths. A plate

of iron, about the twelfth part of an inch in thickness, is turned round a mandril, and welded its whole length in the same manner as a plain barrel. Upon this slight barrel, which is called the *lining*, a plate of iron about an inch in breadth, and bevelled off at the edges, is by means of successive heats rolled in a spiral direction; after which it is termed the *ribbon*, and must have a thickness corresponding with that part of the barrel which it is to form. As it would, however, be difficult to form a ribbon of sufficient length for the whole barrel, it is made in several pieces; and when one piece is rolled on, another is welded to its end, and the operation continued until the lining be entirely covered. The edges are so much bevelled, that the one folds over the other about a quarter of an inch. After the ribbon is all rolled on, the barrel must be heated by two or three inches at a time, and the turns of the spiral united to each other and to the lining by being welded in the same manner as the twisted barrel; though, from what has been said of the construction of these barrels, it is plain that the operation of *jumping* cannot be admitted in them. The barrel is afterwards bored in such a manner that almost the whole of the lining is cut out, and scarce any thing left but the ribbon with which the lining was covered.

The superiority of twisted and ribbon barrels over the plain kind gave occasion to a third sort named *wired barrels*. These were invented by an ingenious workman at Paris named *Barrois*; whose method was as follows: Upon a thin barrel, filed and dressed as usual, he rolled, as close as possible, and in a spiral direction, a tempered iron wire about the thickness of a crow-quill, the first layer covering only the reinforced part. The turns of the wire were foldered to each other and to the barrel with a composition which he kept a secret. The wired part was then filed smooth and bright, but not so much as to weaken it; a second layer of wire was applied over the first, extending two-thirds of the length of the barrel; and this being smoothed and brightened like the first, a third layer was applied, which covered the two former and reached quite to the muzzle. The barrels made after this manner are supposed to be much superior to others, though the supposition seems not to be well founded.

The Spanish barrels have been long held in great estimation; yet as the Spanish iron is universally allowed to be unusually good, it is probable that the superiority of their barrels is owing more to the goodness of the materials than to the skill of the workmen. It must be observed, however, that instead of making the plates overlap *a little* in the place where they join, they give one of them a complete turn; so that every Spanish barrel may be said to be double throughout its whole length. The different portions of the iron are also forged in such a manner, that the grain of the iron is disposed in a spiral manner; whence it has the same effect with a ribbon or twisted barrel. The outside is finished by turning them in a lathe; whence probably they are always less elegantly wrought than the French and English pieces. The great value put upon them is also thought to be more owing to fancy than to any real good qualities they possess. Formerly they were made from three to three feet and a half long; their bore being such as to admit a bullet from 22 to 24 in the pound; and their weight from three to three pounds and an half. The reinforced part extends two-fifths of the length; and at 10 or 12 inches from the breech is placed a *sight*, such as is usually put upon rifle-barrels, or those intended only for ball. According to Espinas, arquebuss-bearer to Philip IV. the weight of a Spanish barrel ought to be four pounds and an half when the length is 42 inches; but both in weight and length they are now much reduced, and seldom exceed the dimensions already mentioned. Next to the barrels made at Madrid, the most esteemed are those of Bustindui and St. Olabe at Placentia in

Biscay; and of Jeun and Clement Padwesteva, Eudal Pous, and Martin Marechal, at Barcelona; the usual price of them being about 3l. 10s. sterling.

Having now described the method of forging barrels, we shall next proceed to give an account of those imperfections to which they are sometimes liable, and which render them apt to burst or recoil with violence. The principal imperfections are the *chink*, *crack*, and *flaw*. The first is a small rent in the direction of the length of the barrel; the second across it; and the third is a kind of scale or small plate adhering to the barrel by a narrow base, from which it spreads out like the head of a nail from its shank, and, when separated, leaves a pit or hollow in the metal. The chink or flaw are of much worse consequence than the crack in fire-arms, the force of the powder being exerted more upon the circumference than the length of the barrel. The flaw is much more frequent than the chink, the latter scarce ever occurring but in plain barrels formed out of a single plate of iron, and then only when the metal is deficient in quality. When flaws happen on the outside, they are of no great consequence; but in the inside they are apt to lodge moisture and foulness which corrode the iron, and thus the cavity enlarges continually till the piece bursts. This accident, however, may arise from many other causes besides the defect of the barrel itself. The best pieces will burst when the ball is not sufficiently rammed home, so that a space is left between it and the powder. A very small windage or passage for the inflamed powder between the sides of the barrel and ball will be sufficient to prevent the accident; but if the ball has been forcibly driven down with an iron ramrod, so as to fill up the cavity of the barrel very exactly, the piece will almost certainly burst, if only a very small space be left between it and the powder; and the greater the space is, the more certainly does the event take place. Of this Mr. Robins has given a remarkable instance, accounting at the same time for the phenomenon. "A moderate charge of powder (says he), when it has expanded itself through the vacant space and reaches the ball, will, by the velocity each part has acquired, accumulate itself behind the ball, and will thereby be condensed prodigiously: whence, if the barrel be not of an extraordinary strength in that part, it must infallibly burst. The truth of this I have experienced in a very good Tower musket forged of very tough iron: for charging it with 12 pennyweight of powder, and placing the ball loosely 16 inches from the breech; on the firing of it, the part of the barrel just behind the bullet was swelled out to double its diameter like a blown bladder, and two large pieces of two inches in length were burst out of it." A piece will frequently burst from having its mouth stoppered up with earth or snow; which accident sometimes happens to sportsmen in leaping a ditch, in which they have assisted themselves with their fowling-piece, putting the mouth of it to the ground; and when this did not happen, it is only to be accounted for from the stoppage being extremely slight. For the same reason a musket will certainly burst if it be fired with the muzzle immersed only a very little way in water. It will also burst from an overcharge; but when such an accident happens in other circumstances, it is most probably to be attributed to a defect in the workmanship, or in the iron itself. These defects are principally an imperfection in the welding, a deep flaw having taken place, or an inequality in the bore; which last is the most common of any, especially in the low-priced barrels. The reason of a barrel's bursting from an inequality in the bore is, that the elastic fluid, set loose by the inflammation of the powder, and endeavouring to expand itself in every direction, being repelled by the stronger parts, acts with additional force against the weaker ones, and frequently bursts through them, which it would not have done had the sides been equally thick and strong throughout. With regard to defects arising from

the bad quality of the iron, it is impossible to say any thing certain. As the choice of the materials depends entirely on the gunsmith, the only way to be assured of having a barrel made of proper metal is to purchase it from an artist of known reputation, and to give a liberal price for the piece.

The recoil of a piece becomes an object of importance only when it is very great; for every piece recoils in some degree when it is discharged. The most frequent cause of an excessive recoil is an inequality in the bore of the barrel; and by this it will be occasioned even when the inequality is too small to be perceived by the eye. The explanation of this upon mechanical principles indeed is not very easy: for as it is there an invariable law, that action and reaction are equal to one another, we should be apt to suppose that every time a piece is discharged it should recoil with the whole difference between the velocity of the bullet and that of the inflamed powder. The cause to which too great a recoil in muskets has been usually attributed, is the placing of the touch-hole at some distance from the breech plug; so that the powder is fired about the middle, or towards its fore-part, rather than at its base. To avoid this, some artists form a groove or channel in the breech-plug as deep as the second or third turn of the screw; the touch-hole opening into this channel, and thus firing the powder at its very lowest part. It appears, however, from a number of experiments made upon this subject by M. le Clerc, that it made very little difference with regard to the recoil, whether the touch-hole was close to the breech or an inch distant from it. The only circumstance to be attended to with respect to its situation therefore is, that it be not quite close to the breech-plug; as in such a case it is found to be more apt to be choked up than when placed about a quarter of an inch from it.

The only other circumstance now to be determined with regard to musket-barrels is their proper length. Formerly it was supposed that the longer they were made, the greater would be the distance to which they carried the shot, and that without any limitation. This opinion continued to prevail till about half a century ago, when it was first proposed as a doubt whether long barrels carried farther than short ones. With regard to cannon, indeed, it had long before this time been known that they might be made too long; and Balthazar Killar, a celebrated cannon-founder in the reign of Louis XIV. was able to account for it. When asked by Mons. Suriry de St. Remy, why the culverin of Nancy, which is 22 feet long, did not carry a ball equally far with a shorter piece? he replied, that "the powder, when inflamed, ought to quit the cavity of the piece in a certain time, in order to exert its whole force upon the bullet; by a longer stay, part of the force is lost; and the same cause may produce an inequality in the shots, by giving a variation to the bullet, so as to destroy its rectilinear course, and throw it to one side or other of the mark." Mr. Robins, who on this, as well as every other question in gunnery, has almost exhausted the subject, informs us, that "if a musket-barrel, of the common length and bore, be fired with a leaden bullet and half its weight of powder, and if the same barrel be afterwards shortened one half and fired with the same charge, the velocity of the bullet in this shortened barrel will be about one-sixth less than what it was when the barrel was entire; and if, instead of shortening the barrel, it be increased to twice its usual length, when it will be near eight feet long, the velocity of the bullet will not hereby be augmented more than one-eighth part. And the greater the length of the barrel is in proportion to the diameter of the bullet, and the smaller the quantity of powder, the more inconsiderable will these alterations of velocity be." From these considerations it appears, that the advantages gained by long barrels are by no means equivalent to the disadvantages arising from the weight and incumbrance of using them; and from a multitude of experiments it is now apparent, that

any one may choose what length he pleases, without any sensible detriment to the range of his piece. The most approved lengths are from 32 to 38 inches.

An opinion has generally prevailed among sportsmen, that by some unknown manœuvre the gunsmith is able to make a piece, loaded with small shot, throw the contents so close together, that even at the distance of 40 or 50 paces the whole will be confined within the breadth of a hat. From such experiments as have been made on this subject, however, it appears, that the closeness or wideness with which a piece throws its shot is liable to innumerable variations from causes which no skill in the gunsmith can possibly reach. So variable are these causes, that there is no possibility of making the same piece throw its shot equally close twice successively. In general, however, the closer the wadding is, the better disposed the shot seems to be to fall within a small compass. The closeness of the shot therefore would seem to depend in a great measure on preventing the flame of the powder from insinuating itself among its particles: whence the following method is said to be practised with success by those who shoot for a wager at a mark with small shot; *viz.* to put in the shot by small quantities at a time, ramming down a little tow or thin paper over each; so as to fill the interstices of the grains, and thus prevent the flame from getting in amongst the grains and scattering them. In firing with small shot, a curious circumstance sometimes occurs, *viz.* that the grains, instead of being equally distributed over the space they strike, are thrown in clusters of 10, 12, 15, or more; whilst several considerable spaces are left without a grain in them. Sometimes one-third or one half of the charge will be collected into a cluster of this kind; nay, sometimes, though much more rarely, the whole charge will be collected into one mass, so as to pierce a board near an inch thick at the distance of 40 or 45 paces. Small barrels are said to be more liable to this clustering than large ones; and M. de Marolles informs us, that this is especially the case when the barrels are new, and likewise when they are fresh-washed; though he acknowledges that it did not always happen with the barrels he employed even after they were washed. It is probable, therefore, that the closeness of the shot depends on some circumstance relative to the wadding rather than to the mechanism of the barrel.

GUNTER (Edmund), an excellent English mathematician and astronomer, was born in Hertfordshire in 1581, and studied at Westminster-school; from whence he removed to Oxford, where he took the degree of master of arts in 1606, and afterwards entered into holy orders. In 1615 he took the degree of bachelor of divinity: but being peculiarly eminent for his knowledge in the mathematics, he had two years before been chosen professor of astronomy in Gresham-college, London; where he distinguished himself by his lectures and writings. He invented a small portable quadrant; and also the famous line of proportions, which, after the inventor, is called *Gunter's scale*. He likewise published *Canon Triangulorum*; and a work, intitled, *Of the Sector, Cross-staff, and other Instruments*. This last was published, with an English translation of his *Canon Triangulorum*, in 4to, by Samuel Foster professor of Gresham-college. Mr. Gunter died at that college in 1626.

GUNTER'S *Line*, a logarithmic line, usually graduated upon scales, sectors, &c. It is also called the *line of lines* and *line of numbers*: being only the logarithms graduated upon a ruler, which therefore serves to solve problems instrumentally in the same manner as logarithms do arithmetically. It is usually divided into 100 parts, every tenth whereof is numbered, beginning with 1 and ending with 10: so that if the first great division, marked 1, stand for one tenth of any integer, the next division, marked 2, will stand for two-tenths, 3, three-tenths,

and so on; and the intermediate divisions will in like manner represent 100th-parts of the same integer. If each of the great divisions represent 10 integers, then will the lesser divisions stand for integers; and if the greater divisions be supposed each 100, the subdivisions will be each 10.

Use of GUNTER'S Line. 1. *To find the product of two numbers.* From 1 extend the compasses to the multiplier; and the same extent, applied the same way from the multiplicand, will reach to the product. Thus if the product of 4 and 8 be required, extend the compasses from 1 to 4, and that extent laid from 8 the same way will reach to 32, their product. 2. *To divide one number by another.* The extent from the divisor to unity will reach from the dividend to the quotient: thus, to divide 36 by 4, extend the compasses from 4 to 1, and the same extent will reach from 36 to 9, the quotient sought. 3. *To three given numbers to find a fourth proportional.* Suppose the numbers 6, 8, 9: extend the compasses from 6 to 8; and this extent, laid from 9 the same way, will reach to 12, the fourth proportional required. 4. *To find a mean proportional between any two given numbers.* Suppose 8 and 32: extend the compasses from 8, in the left-hand part of the line, to 32 in the right; then bisecting this distance, its half will reach from 8 forward, or from 32 backward, to 16, the mean proportional sought. 5. *To extract the square-root of any number.* Suppose 25: bisect the distance between 1 on the scale and the point representing 25; then the half of this distance, set off from 1, will give the point representing the root 5. In the same manner the cube root, or that of any higher power, may be found by dividing the distance on the line between 1 and the given number into as many equal parts as the index of the power expresses; then one of those parts, set from 1, will find the point representing the root required.

GUNTER'S *Quadrant*, one made of wood, brass, &c. containing a kind of stereographic projection of the sphere, on the plane of the equinoctial; the eye being supposed placed in one of the poles.

GUNTER'S *Scale*, called by navigators simply the *gunter*, is a large plain scale, generally two feet long, and about an inch and a half broad, with artificial lines delineated on it, of great use in solving questions in trigonometry, navigation, &c.

GUNWALE, or GUNNEL, is the uppermost wale of a ship, or that piece of timber which reaches on either side from the quarter-deck to the fore-castle, being the uppermost bend which finishes the upper works of the hull, in that part in which are put the stanchions which support the waste-trees.

GURK, an episcopal town of Carinthia in Germany, seated on the river Gurk, in E. long. 14. 15. N. lat. 47. 10.

GURNARD, in ichthyology. See TRIGLA.

GUSTAVIA, in botany; a genus of the polyandria order, belonging to the monadelphia class of plants. There is no calyx; the petals very numerous; the berry multilocular; the seeds appendaged.

GUTTA ROSACEA, in medicine, denotes a red or pimpled face; a disease which, though not always owing its existence to hard drinking, is nevertheless most incident to tipplers of strong beer, wines, spirits, &c.

GUTTA SERENA, a disease in which the patient, without any apparent fault in the eye, is deprived of sight. See SURGERY.

GUTTA, in architecture, are ornaments in the form of little cones used in the Doric cornice, or on the architrave underneath the triglyphs, representing a sort of drops or bells.

GUTTY, in heraldry, a term used when any thing is charged or sprinkled with drops. In blazoning, the colour of the drops is to be named; as gutty of sable, of gules, &c.

GUY (Thomas), an eminent bookseller, founder of the hospital for sick and lame in Southwark bearing his name, was the son of Thomas Guy, lighterman and coal-dealer in Horsley-

down, Southwark. He was put apprentice, in 1660, to a bookseller in the porch of Mercer's-chapel; and set up trade with a stock of about 200*l.* in the house that forms the angle between Corn-hill and Lombard-street. The English Bibles being at that time very badly printed, Mr. Guy engaged with others in a scheme for printing them in Holland, and importing them; but this being put a stop to, he contracted with the university of Oxford for their privilege of printing them, and carried on a great bible-trade for many years to a considerable advantage. Thus he began to accumulate money, and his gains rested in his hands; for, being a single man, and very penurious, his expences could not be great when it was his custom to dine on his shop-counter with no other table-covering than an old newspaper: he was moreover as little scrupulous about the style of his apparel. The bulk of his fortune, however, was acquired by purchasing seamen's tickets during queen Anne's wars, and by South-Sea stock in the memorable year 1720. To show what great events spring from trivial causes, it may be observed, that the public owe the dedication of the greatest part of his immense fortune to charitable purposes, to the indifereet officiousness of his maid-servant in interfering with the mending of the pavement before the door. Guy had agreed to marry her; and, preparatory to his nuptials, had ordered the pavement before his door, which was in a neglected state, to be mended, as far as to a particular stone which he pointed out. The maid, while her master was out, innocently looking on the paviers at work, saw a broken place that they had not repaired, and mentioned it to them: but they told her that Mr. Guy had directed them not to go so far. Well, says she, do you mend it: tell him I bade you, and I know he will not be angry. It happened, however, that the poor girl presumed too much on her influence over her careful lover, with whom a few extraordinary shillings expence turned the scale totally against her: the men obeyed; Guy was enraged to find his orders exceeded, his matrimonial scheme was renounced, and so he built hospitals in his old age. In the year 1707 he built and furnished three wards, on the north side of the outer court of St. Thomas's Hospital in Southwark, and gave 100*l.* to it annually for eleven years preceding the erection of his own hospital: and, some time before his death, erected the stately iron gate, with the large houses on each side, at the expence of about 3000*l.* He was 76 years of age when he formed the design of building the hospital contiguous to that of St. Thomas's, which bears his name, and lived to see it roofed in; dying in the year 1724. The charge of erecting this vast pile amounted to 18,793*l.* and he left 219,499*l.* to endow it; a much larger sum than had ever been dedicated to charitable uses in this kingdom by any one man. He erected an alms-house with a library at Tamworth in Staffordshire (the place of his mother's nativity, and for which he was representative in parliament) for 14 poor men and women; and for their pensions, as well as for the putting out poor children apprentices, bequeathed 125*l.* a-year. Lastly, he bequeathed 1000*l.* to every one who could prove themselves in any degree related to him.

GUY, a rope used to keep steady any weighty body whilst it is hoisting or lowering, particularly when the ship is shaken by a tempestuous sea.

GUY is likewise a large slack rope, extending from the head of the main-mast to the head of the fore-mast, and having two or three large blocks fastened to the middle of it. This is chiefly employed to sustain the tackle used to hoist in and out the cargo of a merchant ship, and is accordingly removed from the mast-head as soon as the vessel is laden or delivered.

GUY'S CLIFF, in Warwickshire, a great cliff on the west side of the Avon and the north side of Warwick, where in the Britons' time was an oratory, and in that of the Saxons an hermitage, where Guy earl of Warwick, who is said to have re-

tired to it after his fatigues by the toils and pleasures of the world, built a chapel, and colliabited with the hermit; and that from thence it had the name. This hermitage was kept up to the reign of Henry VI. when Richard Beauchamp earl of Warwick established a chantry here, and in memory of the famous Guy erected a large statue of him in the chapel eight feet in height, and raised a roof over the adjacent springs. The chapel is in the parish of St. Nicholas, in the suburbs of Warwick.

GUYON (Johanna Mary Bouriers de la Mothe), a French lady, memorable for her writings, and for her sufferings in the cause of Quietism, was descended from a noble family, and born at Montargis in 1648. She shewed some extraordinary symptoms of illumination from her earliest infancy, and tried to take the veil before she was of age to dispose of herself; but her parents obliged her to marry a gentleman to whom they had promised her. She was a widow at the age of 28; when distinguishing herself in, and making many converts to, the way of contemplation and prayer known by the name of *Quietism*, complaints were made of her spiritualism, and she was confined by order of the king, and severely examined for eight months. She was discharged; but was afterwards involved in the persecution of the archbishop of Cambray, and thrown into the Bastille, where she underwent many examinations: but nothing being made out against her, she once more obtained her liberty, and lived private till her death, in 1717. She spent her latter years in mystical reveries; covering her tables, ceilings, and every thing that would receive them, with the traces of a visionary imagination. Her pious verses were collected after her death in 5 vols. intitled, *Cantiques spirituels, ou d'Emblemes sur l'Amour Divin*. Her publications were, *Le moyen court et tres facile de faire Oraisons*; and *Le Cantique des Cantiques de Salomon interprete selon le sens mystique*; which were condemned by the archbishop of Paris.

GWINIAD, in ichthyology. See SALMO.

GYARUS, in the ancient geography, one of the Cyclades, 12 miles in compass, lying to the east of Delos. It was a desert island, and allotted for a place of banishment by the Romans.

GYBING, the act of shifting any boom sail from one side of the mast to the other. In order to understand this operation more clearly, it is necessary to remark, that by a boom-sail is meant any sail whose bottom is extended by a boom, the fore-end of which is hooked to its respective mast; so as to swing occasionally on either side of the vessel, describing an arch, of which the mast will be the centre. As the wind or the course changes, it also becomes frequently necessary to change the position of the boom, together with its sail, which is accordingly shifted to the other side of the vessel as a door turns upon its hinges. The boom is pushed out by the effort of the wind upon the sail, and is restrained in a proper situation by a strong tackle communicating with the vessel's stern, and called the *sheet*. It is also confined on the fore-part by another tackle called the *guy*.

GYGES, in fabulous history, a Lydian, to whom Candaules king of the country showed his wife naked. The queen was so incensed at this instance of imprudence and infirmity in her husband, that she ordered Gyges either to prepare for death himself, or to put Candaules to death. He chose the latter; and, marrying the queen, ascended the vacant throne about 718 years before the Christian era. He was the first of the Mermnadæ who reigned in Lydia. He reigned 38 years, and distinguished himself by the immense presents which he made to the oracle of Delphi (*Herod.* 1. c. 8.) According to Plato, Gyges descended into a chasm of the earth, where he found a brazen horse, whose sides he opened, and saw within the body the carcase of a man of uncommon size, from whose finger he

took a brazen ring. This ring, when he put it on his finger, rendered him invincible; and by means of its virtue he introduced himself to the queen, murdered her husband, and married her and usurped the crown of Lydia. *Cic. Off. iii. c. 9.*

GYMNASIARCH, in antiquity, the director of the gymnasium. He had two deputies under him; the one called *xyfarch*, who presided over the *athletæ*, and had the oversight of wrestling; the other was *gymnastes*, who had the direction of all other exercises.

GYMNASIUM, in Grecian antiquity, a place fitted for performing exercises of the body, &c. The word is Greek, formed of *γυμνός*, "naked;" by reason they anciently put off their clothes, to practise with the more freedom. *Gymnasia*, according to Potter, were first used at Lacedæmon, but were afterwards very common in all parts of Greece; and imitated, very much augmented, and improved, at Rome. There were three principal gymnasia at Athens; the Academy, where Plato taught; the Lyceum, noted for Aristotle's lectures; and the Cynosarges, allotted for the populace.

Vitruvius describes the structure and form of the ancient gymnasia, lib. v. cap. 11. They were called *gymnasia*, because several of the exercises were performed naked; and *palæstræ*, from wrestling, which was one of the most usual exercises there: the Romans sometimes also called them *thermæ*, because the baths and bagnios made a principal part of the building. It appears that they did not perform their exercises quite naked so early as the time of Homer, but always in drawers; which they did not lay aside before the 32d Olympiad. One Orsippus is said to have been the first who introduced the practice: for having been worsted by means of his drawers undoing and entangling him, he threw them quite aside, and the rest afterwards imitated him. They were not single edifices, but a knot of buildings united, being sufficiently capacious to hold many thousands of people at once; and having room enough for philosophers, rhetoricians, and the professors of all other sciences to read their lectures; and wrestlers, dancers, and all others who had a mind to exercise; at the same time without the least disturbance or interruption. They consisted of a great many parts. Vitruvius recites no less than 12, viz. 1. The *exterior porticos*, where the philosophers, rhetoricians, mathematicians, physicians, and other virtuosi, read public lectures, and where they also disputed and rehearsed their performances. 2. The *ephebeum*, where the youth assembled very early, to learn their exercises in private, without any spectators. 3. The *coryceum*, apodyterion, or gymnasterion, a kind of wardrobe, where they stripped, either to bathe or exercise. 4. The *elaothesium*, alipterion, or unctuarium, appointed for the unctions, which either preceded or followed the use of the bath, wrestling, pancratia, &c. 5. The *conisterium* or conistra, in which they covered themselves with sand or dust, to dry up the oil or sweat. 6. The *palæstra*, properly so called, where they practised wrestling, the pugillate, pancratia, and various other exercises. 7. The *spharisterium* or tennis-court, reserved for exercises wherein they used balls. 8. Large *unpaved alleys*, which comprehended the space between the porticos and the walls wherewith the edifice was surrounded. 9. The *xyfili*, which were porticos for the wrestlers in winter or bad weather. 10. Other *xyfili* or open alleys, allotted for summer or fine weather, some of which were quite open, and others planted with trees. 11. The *baths*, consisting of several different apartments. 12. The *stadium*, a large space of a semicircular form, covered with sand, and surrounded with seats for the spectators.

For the administration of the gymnasia, there were different officers: the principal were, 1. The *gymnasiarcha*, who was the director and superintendant of the whole. 2. The *xyfarcha*, who presided in the *xyfili*, or stadium. 3. The *gymnasta*, or

master of the exercises, who understood their different effects, and could accommodate them to the different complexions of the *athletæ*. 4. The *pedotriba*, whose business was mechanically to teach the exercises, without understanding their theory or use. Under these four officers were a number of subalterns, whose names distinguished their different functions.

The gymnastic exercises may be reduced to two general classes; as they depend either on the action of the body alone, or as they require external agents or instruments. The latter consisted chiefly in mounting the horse, driving the chariot, and swimming. The former were chiefly of two kinds; orcheftice, and palæstrice. The *orcheftice* comprehended, 1. Dancing. 2. Cubitice, or the art of tumbling. 3. Sphæristice or tennis, including all the exercises with pilæ or balls. The *palæstrice* comprised all exercises under the denomination *palæstræ*; as wrestling, boxing, pancratia, hoplomachia, running, leaping, throwing the discus, the exercise of the javelin, and that of the hoop, denominated by the Greeks *τροχός*, which consisted in rolling an iron hoop five or six feet in diameter, beset with iron rings, the noise of which apprising the people to give way, afforded them also an amusement. Both strength and skill were requisite in directing this hoop, which was to be driven with an iron rod. To these must also be added the exercises belonging to the medicinal gymnastics; as, 1. Walking. 2. Vociferation, or shouting. 3. Holding the breath. Hoffman enumerates no fewer than 55 sorts of exercises that were practised in the gymnasia.

GYMNASTICS, GYMNASTICE, or the GYMNASTIC art, denotes the art of performing exercises of the body, whether for defence, health, or diversion. See GYMNASIUM. Several modern writers have treated of this art. M. Burette has given the history of gymnastics in the Memoirs of the Royal Academy of Inscriptions. On the first establishment of society, men, being apprised of the necessity of military exercises for repelling the insults of their neighbours, instituted games and proposed prizes to animate their youth to combats of divers kinds. And as running, leaping, strength and dexterity of arm in throwing the javelin, driving a ball, or tossing a quoit, together with wrestling, &c. were exercises suited to the manner of fighting in those days, so the youth vied to excel in them, in the presence of the aged, who sat as their judges, and dispensed prizes to the conquerors; till what was originally only amusement became at length a matter of such importance as to interest great cities and entire nations in its practice. Hence arose an emulation and eagerness to excel, in hopes one day of being proclaimed and crowned conquerors in the public games, which was the highest honour a mortal could arrive at: nay, they went so far as to imagine, that even gods and demigods were not insensible of what men were so captivated with; and, in consequence hereof, to introduce the greatest part of these exercises into their religious ceremonies, the worship of their gods, and the funeral honours done to the manes of the dead.

Though it be hard to determine the precise epocha of the gymnastic art, yet it appears from several passages in Homer, and particularly the 23d book of the Iliad, where he describes the games celebrated at the funeral of Patroclus, that it was not unknown at the time of the Trojan war. From that description, which is the earliest monument now extant of the Grecian gymnastics, it appears that they had chariot-races, boxing, wrestling, foot-races, gladiators, throwing the discus, drawing the bow, and hurling the javelin; and it should seem, from the particular account Homer gives of these exercises, that even then the gymnastic art wanted little of perfection: so that when Galen says there was no gymnastic art in Homer's days, and that it began to appear no earlier than Plato, he is to be understood of the medicinal gymnastics only. This last,

indeed, had its rise later; because, while men continued sober and laborious, they had no occasion for it; but when luxury and idleness had reduced them to the sad necessity of applying to physicians, these, who had found that nothing contributed so much to the preservation and re-establishment of health as exercises proportioned to the different complexions, ages, and sexes, did not fail to refer them to the practice of gymnallies.

According to Plato, one Herodicus, prior a little time to Hippocrates, was the first who introduced this art into physic; and his successors, convinced by experience of its usefulness, applied themselves in earnest to improve it. Hippocrates, in his book of Regimen, has given instances of it, where he treats of exercise in general, and of the particular effects of walking, with regard to health; also of the different sorts of races, either on foot or horseback; leaping, wrestling, the exercise of the suspended ball, called *corycus*, chironomy, unctions, frictions, rolling in the sand, &c. But as physicians did not adopt all the exercises of the gymnastic art in their practice, it came to be divided between them and the masters of martial and athletic exercises, who kept schools, the number of which was greatly increased in Greece. At length the Romans also caught the same taste; and, adopting the military and athletic exercises of the Greeks, they improved and advanced them to the utmost pitch of magnificence, not to say extravagance. But the declension of the empire involved the arts in its ruin, and, among others, gymnastics and medicine; which last unhappily then relinquished the title it had to the former, and has neglected to resume it ever since.

GYMNOPYRIS, in natural history, a name given by Dr. Hill to the pyritæ of a simple internal structure, and not covered with a crust. See **PYRITES**. Of these there are only two species. 1. A green variously shaped kind. 2. A botryoide kind. The first species is the most common of all the pyritæ, and appears under a great diversity of shapes. It is very hard and heavy, very readily gives fire with steel, but will not at all ferment with aquafortis. The second species is very elegant and beautiful, and its usual colour is a very agreeable pale green; but what most distinguishes it from all other pyritæ is, that its surface is always beautifully elevated into tubercles of various sizes, resembling a cluster of grapes.

GYMNOSOPHISTS, a set of Indian philosophers, famous in antiquity, so denominated from their going barefoot. The word is formed of the Greek *γυμνοσophistes*, q. d. a sophist or philosopher who goes naked. This name was given to the Indian philosophers, whom the excessive heat of the country obliged to go naked; as that of *Peripatetics* was given to those who philosophised walking. The gymnosophists, however, did not go absolutely naked; but only clothed themselves no farther than modesty required. There were some of these sages in Africa; but the most celebrated clan of them was in India. The African gymnosophists dwelt upon a mountain in Ethiopia, near the Nile, without the accommodation either of house or cell. They did not form themselves into societies like those of India; but each had his private recess, where he studied and performed his devotions by himself. If any person had killed another by chance, he applied to these sages for absolution, and submitted to whatever penances they enjoined. They observed an extraordinary frugality, and lived only upon the fruits of the earth. Lucan ascribes to these gymnosophists several new discoveries in astronomy.

As to the Indian gymnosophists, they dwelt in the woods, where they lived upon the wild products of the earth, and never drank wine, nor married. Some of them practised physic, and travelled from one place to another; these were particularly famous for their remedies against barrenness. Some of them,

likewise, pretended to practise magic, and to foretell future events.

In general, the gymnosophists were wise and learned men: their maxims and discourses, recorded by historians, do not in the least favour of a barbarous education, but are plainly the result of great sense and deep thought. They kept up the dignity of their character to so high a degree, that it was never their custom to wait upon any body, not even upon princes themselves. They believed the immortality and transmigration of the soul: they placed the chief happiness of man in a contempt of the goods of fortune and the pleasures of sense, and gloried in having given faithful and disinterested counsels to princes and magistrates. It is said, that when they became old and infirm, they threw themselves into a pile of burning wood, in order to prevent the miseries of an advanced age. One of them, named *Calamus*, thus burnt himself in the presence of Alexander the Great.

Apuleius (Florid. lib. 1.) describes the gymnosophists thus: "They are all devoted to the study of wisdom, both the elder masters and the younger pupils; and what to me appears the most amiable thing in their character is, that they have an aversion to idleness and indolence: accordingly, as soon as the table is spread, before a bit of victuals be brought, the youths are all called together from their several places and offices, and the masters examine them what good they have done since the sun-rise: here one relates something he has discovered by meditation; another has learned something by demonstration; and as for those who have nothing to allege why they should dine, they are turned out to work fasting." The great leader of the gymnosophists, according to Jerome, was one *Buddas*, so called by Clemens Butta, who is ranked by Suidas among the Brachmans. That last author makes Buddas, the preceptor of Manes the Persian, the founder of the gymnosophists.

GYMNOSPERMIA, in botany, from *γυμνός* "naked," and *σπέρμα* "seed;" the first order in Linnaeus's class of didynamia. It comprehends those plants of that class which have naked seeds. The seeds are constantly four in number, except in one genus, viz. *phryma*, which is monospermous. See **BOTANY**, p. 42.

GYMNOTUS, in ichthyology, a genus of fishes belonging to the order of apodes. They have two tentacula at the upper lip; the eyes are covered with the common skin; there are five rays in the membrane of the gills; the body is compressed, and carinated on the belly with a fin. There are five species, the most remarkable of which is the *electricus*, or electric eel, called by the French *anguille tremblante*. See pl. 2. This species is peculiar to Surinam, and is found in the rocky parts of the river, at a great distance from the sea. The most accurate description we have of this fish is in the Philosophical Transactions for 1775, where Alex. Garden, M. D. gives an account of three of them brought to Charlestown in South Carolina. The largest was about three feet eight inches in length, and might have been from 10 to 14 inches in circumference about the thickest part of its body. The head was large, broad, flat, and smooth; impressed here and there with holes, as if perforated with a blunt needle, especially towards the sides, where they were more regularly ranged in a line on each side. There were two nostrils on each side; the first large, tubular, and elevated above the surface; the others small, and level with the skin. The eyes were small, flattish, and of a blueish colour, placed about three quarters of an inch behind the nostrils. The whole body, from about four inches below the head, was clearly distinguished into four longitudinal parts or divisions. The upper part or back was of a dark colour, and separated from the other parts on each side by the *lateral lines*. These lines took their rise at the base of the head, just above

the pectoral fins, and run down the sides, gradually converging as the fish grew smaller to the tail. The second division was of a lighter and clearer colour than the first, inclining to blue. It seemed to swell out on each side; but towards the under part it is again contracted and sharpened into the third part or *carina*. This part is easily distinguished from the other two by its thinness, its apparent laxness, and by the reticulated skin of a more grey and light colour, with which it is covered. The *carina* begins about six or seven inches below the base of the head; and, gradually deepening or widening as it goes along, reaches down to the tail, where it is thinnest. The fourth part is a long, deep, soft, and wavy fin, which takes its rise about three or four inches at most below the head, and thus runs down the sharp edge of the *carina* to the extremity of the tail. The situation of the anus was very singular, being an inch more forward than the pectoral fins. Externally it seemed to be a pretty large *rima*; but the formed excrements were only the size of a quill or those of a common fowl. There were two pectoral fins situated just behind the head, scarcely an inch in length; of a very thin, delicate consistence, and orbicular shape. They seemed to be chiefly useful in supporting and raising the head of the fish when he came up to breathe; which he was obliged to do every four or five minutes. Across the body were a number of small bands, annular divisions, or rather *rugæ* of the skin. By means of these the fish seemed to partake of the vermicular nature, had the power of lengthening or shortening its body like a worm, and could swim backwards as well as forwards, which is another property of the vermicular tribe. Every now and then it laid itself on one side in the water, as if to rest.—For an account of the singular properties of this fish, see TORPEDO and ELECTRICITY, p. 264.

GYNÆCEUM, among the ancients, the apartment of the women, a separate room in the inner part of the house, where they employed themselves in spinning, weaving, and needlework.

GYNÆCOCRACY, denotes the government of women, or a state where women are capable of the supreme command. Such are Britain and Spain.

GYNÆCOCRATUMENI, an ancient people of Sarmatia Europæa, inhabiting the eastern banks of the river Tanais, near its opening into the Palus Mæotis; thus called, as authors relate, because they had no women among them; or, rather, because they were under the dominion of women. The word is formed of *γυν* woman, and *κατασκευα*: *vanquished*, of *κατα* I overcome, q. d. overcome by women. Fa. Hardouin, in his notes on Pliny, says they were thus called, because, after a battle which they lost against the Amazons, on the banks of the Thermoodon, they were obliged to have venereal commerce with them, in order to get them children: *Et quod victricibus obsequantur ad procurandam eis sobolem*.—Hardouin calls them the husbands of the Amazons, *Amazonum connubia*; for, as the author observes, the word *unde* must be retrenched from Pliny, having been foisted into the text by people who were not masters of the author's meaning, *unde Amazonum connubia*. See AMAZONS. They who take the Amazons for a fabulous people will conclude the same of the Gynæocratumenians.

GYNANDRIA, from *γυν* a “woman,” and *ανδρ* a “man,” the name of the 20th class in Linnæus's sexual system, consisting of plants with hermaphrodite flowers, in which the stamina are placed upon the style, or, to speak more properly, upon a pillar-shaped receptacle resembling a style, which rises in the middle of the flower, and bears both the stamina and pointal; that is, both the supposed organs of generation. See BOTANY, p. 46. The flowers of this class, says Linnæus, have a monstrous appearance, arising, as he imagines, from the singular and unusual situation of the parts of fructification.

GYPSIES, or EGYPTIANS, an outlandish tribe of vagabonds, who disguising themselves in uncouth habits, smearing their faces and bodies, and framing to themselves a canting language, wander up and down, and, under pretence of telling fortunes, curing diseases, &c. abuse the common people, trick them of their money, and steal all that they can come at.

They are a strange kind of commonwealth among themselves of wandering impostors and jugglers, who made their first appearance in Germany about the beginning of the 16th century. Munster, it is true, who is followed and relied upon by Spelman, fixes the time of their first appearance to the year 1417: but as he owns that the first whom he ever saw were in 1529, it is probably an error of the press for 1517; especially as other historians inform us, that when Sultan Selim conquered Egypt in the year 1517, several of the natives refused to submit to the Turkish yoke, and revolted under one Zinganeus; whence the Turks call them Zinganees; but being at length surrounded and banished, they agreed to disperse in small parties all over the world, where their supposed skill in the black art gave them an universal reception in that age of superstition and credulity. In the compass of a very few years they gained such a number of idle profelytes (who imitated their language and complexion, and betook themselves to the same arts of chiromancy, begging and pilfering), that they became troublesome, and even formidable, to most of the states of Europe. Hence they were expelled from France in the year 1560, and from Spain in 1591. And the government of England took the alarm much earlier: for in 1530 they are described by Stat. 22 Hen. VIII. c. 10. as “an outlandish people calling themselves Egyptians, using no craft nor feat of merchandize, who have come into this realm, and gone from shire to shire, and place to place, in great companies, and used great, subtle, and crafty means to deceive the people; bearing them in hand, that they by palmistry could tell men's and women's fortunes; and so many times by craft and subtilty have deceived the people of their money, and also have committed many heinous felonies and robberies.” Wherefore they are directed to avoid the realm, and not to return under pain of imprisonment, and forfeiture of their goods and chattels; and upon their trials for any felony which they may have committed, they shall not be entitled to a jury *de medietate lingue*. And afterwards it is enacted, by statutes 1st and 2d Ph. and Mary, c. 4. and 5th Eliz. c. 20. that if any such persons shall be imported into the kingdom, the importer shall forfeit 40l. And if the Egyptians themselves remain one month in the kingdom, or if any person being 14 years old, whether natural-born subject or stranger, which hath been seen or found in the fellowship of such Egyptians, or which hath disguised him or herself like them, shall remain in the same one month at one or several times, it is felony without benefit of clergy. And Sir M. Hale informs us, that at one Suffolk assizes, no less than 13 persons were executed upon these statutes a few years before the restoration. But, to the honour of our national humanity, there are no instances more modern than this of carrying these laws into practice; and the last sanguinary act is itself now repealed by 23 Geo. III. c. 54.

In Scotland they seem to have enjoyed some share of indulgence; for a writ of privy seal, dated 1594, supports John Faw, lord and earl of Little Egypt, in the execution of justice on his company and folk, conformable to the laws of Egypt, and in punishing certain persons there named who rebelled against him, left him, robbed him, and refused to return home with him. James's subjects are commanded to assist in apprehending them, and in assisting Faw and his adherents to return home. There is a like writ in his favour from Mary Q. of Scots 1553, and in 1554 he obtained a pardon for the murder of Nunan Small. So that it appears he had staid long in Scotland,

and perhaps some of the time in England; and from him this kind of strolling people might receive the name of *Faw Gang*, which they still retain.

A very circumstantial account of this singular race of vagrants has been lately given in an express *Enquiry* concerning them, written in German by H. M. G. Grellman, and translated by Mr. Raper. It is incredible to think how this regular swarm of banditti has spread itself over the face of the earth. They wander about in Asia, in the interior parts of Africa, and, like locusts, have over-run most of the European nations. In the reigns of Henry VIII. and queen Elizabeth, as we have seen, they were set up as a mark of general persecution in England; yet their numbers do not appear to have much diminished. Spain is supposed by Mr. Twiss to contain 40,000 of these vagrants; but by others 60,000; and by some even double that number. They became less numerous in France in consequence of the strictness of the police. In Italy they abound, especially in the dominions of the church, on account of the bad police and the prevalence of superstition, which permit and entice them to deceive the ignorant. They are scattered, though not in great numbers, through Germany, Denmark, Sweden, and Russia; but their chief population is in the south-east parts of Europe, which seem to be the general rendezvous of the gypsy nation. At a moderate computation Europe contains more than seven hundred thousand of these vagabonds. For near four centuries they have wandered through the world; and in every region, and among every people, whether barbarous or civilized, they have continued equally unchanged by the lapse of time, the variation of climate, and the force of example. Their singular physiognomy and particular manners are the same in every country. Their swarthy complexion derives no darker shade from the burning sun of Africa, nor any fairer tincture from the temperate climates of Europe; they contract no additional laziness in Spain, nor acquire any new industry in England; in Turkey they behold the mosque and the crescent with equal indifference as they do the reformed and the catholic church in Europe. In the neighbourhood of civilized life they continue barbarous; and, beholding around them cities and settled inhabitants, they live in tents or holes in the earth, and wander from place to place as fugitives and vagabonds.

They are passionately fond of ornaments; in which, however, they consult neither propriety nor consistency; they will wear an old laced coat, while the rest of the garments scarcely hang together. In Hungary and Transylvania, their summer habitations are tents; their winter ones, holes 10 or 12 feet deep in the earth, except such as keep inns, or exercise trades. They are fond of plate, particularly silver cups, which they bury under the hearth for security. Their principal occupations are, smith's work, or tinkers, or wooden ware, and horse-dealing; and in Hungary and Transylvania they are executioners of criminals, slayers of dead beasts, and washers of gold. The women deal in old clothes, prostitution, wanton dances, and fortune-telling. Notwithstanding these occupations, the majority of this people are lazy, beggars, and thieves. They bring up their children to their own professions, and are very fond of them. They have few disorders, except the measles and small-pox, and weaknesses in their eyes, occasioned by the smoke, and live to an advanced age, with a strong attachment to life. Their physic is saffron in their soups, or bleeding.

These people, however, appear to be distinguished by different singularities in different countries. At least in the following circumstances the German gypsies differ widely from those we commonly meet with in England. It is a great feast to them, our author says, whenever they can procure a roast of cattle that died of any distemper. It is all one to them, whether it be carrion of a sheep, hog, cow, or other beast, horse-

flesh only excepted; they are so far from being disgusted with it, that to eat their fill of such a meal is to them the height of epicurism. When any one censures their taste, or shows surprise at it, they answer, "The flesh of a beast which God kills must be better than that of one killed by the hand of man." They therefore take every opportunity of getting such dainties. That they take carrion from a laystall, as is affirmed of the gypsies in Hungary, is by no means certain, any more than that they eat horse-flesh. But if a beast out of an herd dies, and they find it before it becomes rotten and putrified; or if a farmer gives them notice of a cow dead, they proceed, without hesitation, to get possession of this booty. Their favourite object is animals that have been destroyed by fire; therefore, whenever a conflagration has happened, either in town or country, the next day the gypsies, from every neighbouring quarter, assemble and draw the suffocated half-consumed beasts out of the ashes. Men, women, and children, in troops, are extremely busy, joyfully carrying the flesh home to their dwelling-places; they return several times, provide themselves plentifully with this roast meat, and gluttonize in their huts as long as their noble fare lasts.

The gypsies have, at least in Transylvania, a sort of regular government, rather nominal than real or effective. They have their leaders or chiefs, whom they distinguish by the Slavonian title, *Waywode*. To this dignity every person is eligible who is of a family descended from a former waywode; but the preference is generally given to those who have the best clothes and the most wealth, who are of a large stature, and not past the meridian of life. Of religion, however, they have no sense; though, with their usual cunning and hypocrisy, they profess the established faith of every country in which they live. They also speak the languages of the respective countries, yet have a language of their own; from whence derived, authors differ. The only science which they have attained is music. Their poetry is ungrammatical indecent rhyme.

Their general character and capacities are thus described: Imagine people of a childish way of thinking; their minds filled with raw, undigested conceptions; guided more by sense than reason; using understanding and reflection so far only as they promote the gratification of any particular appetite; and you have a perfect sketch of the gypsy character. They are lively, uncommonly loquacious and chattering; fickle in the extreme, consequently inconstant in their pursuits; faithless to every body, even their own cast; void of the least emotion of gratitude, frequently rewarding benefits with the most insidious malice. Fear makes them slavishly compliant when under subjection; but having nothing to apprehend, like other timorous people, they are cruel. Desire of revenge often causes them to take the most desperate resolutions. To such a degree of violence is their fury sometimes excited, that a mother has been known, in the excess of passion, to take her small infant by the feet, and therewith strike the object of her anger, when no other instrument has readily presented itself. They are so addicted to drinking, as to sacrifice what is most necessary to them, that they may feast their palates with spirits. They have, too, what one would little expect, an enormous share of vanity, which shows itself in their fondness for fine clothes, and their gait and deportment when dressed in them. One might imagine, that this pride would have the good effect to render a gypsy cautious not to be guilty of such crimes as subject him to public shame; but here comes in the levity of character, for he never looks to the right nor to the left in his transactions. In an hour's time he forgets that he is just untied from the whipping-post. But their pride is grounded on mere idle conceit, as appears plainly from their making it a point of honour to abuse their companions, and put on a terrible appearance in the public market, where they are sure to have

many spectators ; they cry out, make a violent noise, challenge their adversary to fight, but very seldom any thing comes of it. Thus the gypsey seeks honour, of which his ideas coincide very little with those of other people, and sometimes deviate entirely from propriety.

“Nothing (continues our author) can exceed the unrestrained depravity of manners existing among these people, I allude particularly to the other sex. Unchecked by any idea of shame, they give way to every desire. The mother endeavours, by the most scandalous arts, to train up her daughter for an offering to sensuality ; and *this* is scarce grown up before she becomes the seducer of others. Laziness is so prevalent among them, that were they to subsist by their own labour only, they would hardly have bread for two of the seven days in the week. This indolence increases their propensity to stealing and cheating, the common attendants on idleness. They seek to avail themselves of every opportunity to satisfy their lawless desires. Their universal bad character therefore for fickleness, infidelity, ingratitude, revenge, malice, rage, depravity, laziness, knavery, thievishness, and cunning, though not deficient in capacity and cleverness, render these people of no use in society, except as soldiers to form marauding parties. Persons in their company, and under their disguise, have formed dangerous designs against cities and countries. They have been banished from almost all civilized states in their turn, except Hungary and Transylvania, and to little purpose. Our author is of opinion, that as Turkey would allow them toleration, it would be better for the European states to take some steps for cultivating and civilizing them, and making them useful. But while they are insensible of religion and strongly attached to their own manners, it is to be feared the attempt will be impracticable. This appears from a very intelligent Hungarian lady's experience on the subject, communicated in a letter as follows: ‘There are a great number of them on my estates, but I have permitted two families in particular to establish themselves at the place of my own residence, under the express condition that no others shall come here and join them. I took all possible pains to make them reasonable creatures. I set the elder ones to work ; the younger ones to tend the cattle. I observed that they were more fond of horses than any thing else ; for which reason I placed a gypsey under each groom. I had their children clothed, that none of them might be running about naked, according to their usual practice. It appeared, however, that custom was become nature with them. The old ones worked diligently so long as any body stood over them ; the moment their back was turned they all got together in a circle, their legs a-cross, facing the sun, and chattered. Thus they cannot possibly earn more, indeed hardly so much, as would find them bread, although very cheap with us ; for the bread I give them does not stand me in half a kreutzer the pound. Even in winter they cannot bear a hat on their head nor shoes on their feet. The boys run like wild things wherever they are sent, either on foot or on horseback ; but they spoil the horses unmercifully, beat them on the head, or jerk the bits in their mouths, so as to make them run down with blood. They cannot be brought by any means whatever to dress horses. Clothe them as you will, they always sell or lose their clothes. In a word, one cannot but consider them as void of reason ; it is really shocking to see even well grown children put whatever they find into their mouths, like infants before they can speak ; wherefore they eat every thing, even carrion, let it stink never so much. Where a mortality happens among the cattle, there these wretched beings are to be found in the greatest numbers.’

The origin of this people, as we have seen, has been generally supposed to be Egyptian ; and that belief is as old as their existence in Europe. Thomasius, Salmon the English geogra-

pher, and lately Signior Griselini, have endeavoured to prove it by satisfactory evidence. This theory, however, according to our author, is without foundation. The Egyptian descent of these people, he thinks, is not only destitute of proofs, but the most positive evidence is found to contradict it. Their language differs entirely from the Coptic ; and their customs are very different from those of the Egyptians. They are indeed to be found in Egypt ; but they wander about there as strangers, and form a distinct people as in other countries. The expressions of Bellonius are strong and decisive : “No part of the world, I believe, is free from those banditti, wandering about in troops, whom we by mistake call *Egyptians* and *Bohemians*. When we were at Cairo, and in the villages bordering on the Nile, we found troops of these strolling thieves sitting under palm-trees ; and they are deemed foreigners in Egypt as well as among us.”

The Egyptian descent of the gypsies being rejected, our author next endeavours to show that they come from Hindostan. The chief basis of his theory, however, is no other than that very dubious one, a similarity of language. He adds a long vocabulary of the gypsey and the Hindostanic languages ; in which, it must be confessed, many words are the same ; but many are different. A principal proof which he adduces on this head is from the relation of Captain Szekely von Doba, to whom a printer in 1763 related, that a preacher of the Reformed church, when a student at Leyden, being intimately acquainted with three young Malabar students, took down 1000 of their words, which he fancied corresponded with the gypsey language ; and they added, that a tract of land in their island was named *Ozigania*. He repeated these words to the Raber gypsies, who explained them without trouble or hesitation. This account was published in the Vienna Gazette. Supposing these three young men to be sons of Bramins, who use the Sanscrit, the common language of Hindostan comes as near to that as modern Italian to pure Latin. The comparison of the two languages takes up above 30 pages ; and Mr. Grellman thinks it establishes his system. The same opinion is maintained by Mr. Marsden, in a paper upon this subject in the 7th volume of the *Archæologia*. The numerals, however, both in Hindostanic and gypsey, differ greatly as stated by the two authors. And here, as in other such comparisons, one is astonished at the credulity of the comparers of orthoepy and orthography (as a periodical critic observes), which can have no connection in languages with which we are not perfectly familiar, even were both languages reduced to writing by their respective people : how much less, then, where one of the two languages is never reduced to writing, as is the case of the gypsey, but is blended with the language of the country where the clan resides ? This appears from the correspondence of several words in all languages with the gypsey. Mr. Grellman acknowledges the two gypsey versions of the Lord's Prayer, at different periods, differ so widely, that one would almost be inclined to doubt whether they were really the same language. We think we can discern a few words differently indeed written, but probably pronounced alike. Nor can we, in all the languages in which Chamberlayne gives the Lord's Prayer, perceive the least resemblance to the gypsey name of father, *Dade* and *Dad*, except in the Welch, *Taad*. In prosecuting his argument, Mr. Grellman does not insist on the similarity of colour between the two people, nor on the cowardice common to both, nor on the attachment of the Indians to tents, or letting their children go naked ; all these being traits to be met with in other nations : but he dwells on the word *Po'gar*, the name of one of the first gypsey leaders, and of the Hindostanic god of marriage ; also on the correspondence between the travelling smiths in the two people, who carry two pair of bellows ; the Indian's boy blows them in India, the wife or child of the

gypsey in Europe : as if every travelling tinker, in every nation where tinkers travel, had not the same journeyman. In lascivious dances and chiromancy the two people agree ; nor are these uncommon in other parts of the globe. The excessive loquacity of the two people is produced as similar ; as if no other nations in the world were loquacious. Fainter resemblances are, a fondness for saffron, and the intermarrying only with their own people. The last position in the author's theory is, that the gypsies are of the lowest class of Indians, namely, *Parias*, or, as they are called in Hindostan, *Suders*. He compares the manners of this class with those of the gypsies, and enumerates many circumstances in which they agree : some of the comparisons are frivolous, and prove nothing ; as an instance of which we may take the following : ' Gypsies are fond of being about horses : the *Suders* in India likewise, for which reason they are commonly employed as horse-keepers by the Europeans resident in that country.' This reasoning does not prove that the gypsies are *Suders*, any more than that they are Arabians or Yorkshire farmers.

The objections, however, to which this learned and industrious author's theory is liable, are such as only show it to be by no means satisfactory ; but do not prove that this is wrong. It may possibly be right ; and upon this supposition the cause of their emigration from their country, he conjectures, not without probability, to be the war of Timur Beg in India. In the years 1408 and 1409 this conqueror ravaged India ; and the progress of his arms was attended with devastation and cruelty. All who made resistance were destroyed ; those who fell into the enemy's hands were made slaves ; of those very slaves 100,000 were put to death. As on this occasion an universal panic took place, what could be more natural than that a great number of terrified inhabitants should endeavour to save themselves by flight ?—In the last place, the author endeavours to trace the route by which the gypsies came from Hindostan to Europe : but here he justly acknowledges that all that can be said on the subject is mere surmise ; and, upon the whole, after perusing all the preceding details, the reader will probably be of opinion that there still hangs a cloud over the origin of this extraordinary race.

GYPSOPHILA, in botany ; a genus of the digynia order, belonging to the decandria class of plants, and in the natural method ranking under the 22d order, *Caryophyllei*. The calyx is monophyllous, campanulate, and angulated ; the petals are five in number, ovate, and sessile ; the capsule globose and unilocular.

GYPSUM, PLASTER-STONE, or *Alabaster* ; a natural combination of the calcareous earth with vitriolic acid. See **ALABASTER**. The properties of gypsum, according to Cronstedt, are, 1. It is looser and more friable than a calcareous earth. 2. It does not effervesce with acids either in its crude or calcined state ; or at most but in a very slight degree, in proportion to what it wants of the vitriolic acid for the complete saturation of its base. 3. It falls into powder in the fire very readily. 4. When burnt without being made red-hot, its powder readily concretes with water into a mass which soon hardens ; but without any sensible heat being excited in the operation. 5. According to our author, it is nearly as difficult of fusion as limestone, and shows almost the same effects upon other bodies with limestone, though the acid of vitriol seems to promote the vitrification. M. Magellan, however, informs us, that he has found most of the gypseous kind, particularly the fibrous, to melt in the fire pretty easily by themselves. 6. When melted in the fire with borax, it puffs and bubbles very much, and for a long time during the fusion. According to M. Magellan, when a small quantity of any gypsum is melted together with borax, the glass becomes colourless and transparent ; but some sorts of alabaster and sparry gypsum, when

melted in quantity with borax, yield a fine yellow transparent coloured glass, resembling that of the best topazes ; but if too much of the gypsum is used in proportion to the borax, the glass becomes opaque, just as it happens with the pure limestone. 8. When burnt with any inflammable matter it emits a sulphureous smell, and may thus be decomposed, as well as by either of the fixed alkaline salts ; but if this last method is followed, there ought to be five or six times as much salt as there is of gypsum. 9. On being decomposed in this manner, the residuum commonly shows some signs of iron.

The species are, 1. *Friable gypseous earth* of a white colour, found in Saxony. 2. *Indurated gypsum* of a solid texture, the particles of which are not visible, commonly called *alabaster*. This is sometimes found unsaturated with vitriolic acid ; in which case only it will effervesce with aquafortis. For its properties, &c. see the article **CHEMISTRY**. It is very easily sawed or cut, and takes a dull polish. It is of several kinds ; as, white ; clear and transparent from Persia, opaque from Italy and Trapano in Sicily ; of a yellow colour, of which there are likewise two kinds, transparent and opaque ; the former being met with in the eastern countries, the latter in Spain. Brunick informs us, that in this country there are a great many fine varieties of the species we treat of ; and from hence he supposes that the ancients obtained the beautiful alabasters they used. Fabroni tells us, that a great variety of fine alabasters are met with in Italy. Twenty-four quarries of them, each of a different colour, are now worked out at Volterra ; but he is of opinion that the Romans brought the greatest part of the alabasters they made use of from Greece. 3. *Gypsum* of a *scaly* texture, or common plaster of Paris. This is found in many different countries, of two kinds, viz. white with coarse scales, or with small scales yellowish or greyish. According to Bergman, plaster contains $\frac{4}{100}$ of vitriolic acid, $\frac{3}{100}$ of pure calcareous earth, and 22 of water. It is soluble in 500 times its weight of warm water, or 450 times its weight of boiling water. It is well known by its property of forming a hard mass with water after being slightly burned ; and during this consolidation a slight degree of heat is produced, though less than when lime is slaked. It is often employed in building ; and may be taken off and used again and again for the same purpose. 4. *Fibrous gypsum*, or plaster-stone, has likewise two varieties, viz. with coarse or with fine fibres. It is of a white colour. 5. *Selenites*, or spar-like gypsum, by some also called *glacies mane*, and confounded with the clear and transparent mica. It is found of two kinds, clear and transparent, or yellowish and opaque. 6. *Crystallized gypsum*, or gypseous drusen. This is found composed of wedge-shaped and sometimes of capillary crystals, sometimes white and sometimes yellowish. 7. *Stalactitical gypsum* is found of a great many different forms and colours. When found in large pieces, it commonly varies between white and yellow, and likewise in its transparency in different parts of the same mass. It is used as alabaster in several works.

Besides the countries already mentioned, England abounds with substances of a gypseous nature. There are plenty in Derbyshire and Nottinghamshire, so fine as to be used like alabaster, that is, to take a fine polish. In the counties just mentioned there are large pits of this kind, also in most of the cliffs of the Severn, especially at the Old Passage in Somersetshire. A very fine semipellucid solid alabaster is found in Derbyshire. Very fine fibrous tales are found in the above-mentioned pits of stone, and many other places. Selenites every where abound, so that it is impossible to enumerate the different places. Very fine gypseous drusen are found in Sheppey Isle, and some exceedingly beautiful, large and clear as crystal, have been dug from the salt-rocks at Nantwich in Cheshire. The selenites rhomboidales is found in plenty in England, though rare in

other countries. Shotover-hill in Oxfordshire is remarkable for them. The Isle of Sheppey affords a kind of spar-like gypsum, of a fibrous nature, and always accreting like the radiations of a star on the septaria, and thence called *stella septarii*.

The principal use of gypsum is a material for small statues and figures of various kinds, also for moulds for casting wax-work, &c. It has also been introduced as a manure in France and America, though its success in this respect has not yet been sufficiently experienced.

GYR-FALCO, in zoology, the name of a large and fierce species of falcon, called in English the *jer-falcon*. See FALCO. It is a very bold and daring bird, attacking all other fowls without reserve, particularly the heron and stork kinds. The other falcons are all afraid of this.

GYRINUS, in zoology; a genus of insects of the coleoptera

order. See pl. 4. vol. iii. The generic characters are: The antennæ are cylindrical, stiff, and shorter than the head: and the eyes are four, two on the upper and two on the under part of the head. Mr. Barbut, however, says that the eyes only appear on the upper and under parts of the head, but that they are not four. The natator, or common water-flea, is of a bright black colour; the feet are yellow, flat, and large; the insect is in length one-third of an inch. It runs with great celerity in circles on the surface of waters, and is very difficult to catch, plunging down instantaneously when attempted to be taken. There are eight other species, which frequent the waters in different parts of the globe.

GYSHORN, a town of Germany, in the duchy of Lauenburgh, situated on the river Aller, in E. lon. 10. 45. N. lat. 52. 50.

H.

H A B

H, The eighth letter and sixth consonant in our alphabet; though some grammarians will have it to be only an aspiration, or breathing. But nothing can be more ridiculous than to dispute its being a distinct sound, and formed in a particular manner by the organs of speech, at least in our language: witness the words *eat* and *beat*, *arm* and *harm*, *ear* and *bear*, *at* and *bat*, &c. as pronounced with or without the *h*. It is pronounced by a strong expiration of the breath between the lips, closing, as it were, by a gentle motion of the lower jaw to the upper, and the tongue nearly approaching the palate. There seems to be no doubt but that our *h*, which is the same with that of the Romans, derived its figure from that of the Hebrew ה. And indeed the Phœnicians, most ancient Greeks and Romans, used the same figure with our *H*, which in the series of all these alphabets keeps its primitive place, being the eighth letter.

H, used as a numeral, denotes 200; and with a dash over it, *H̄*, 200,000.

As an abbreviation, *H* was used by the ancients to denote *homo*, *hæres*, *hora*, &c. Thus *H. B.* stood for *hæres bonorum*; and *H. S.* corruptly for *L. L. S. festerce*; and *H. A.* for *Hadrianus*.

HAAG, or HAG, a town of the duchy of Bavaria in Germany, seated on a hill on the west side of the river Inn, in E. lon. 12. 23. N. lat. 48. 16.

HABAKKUK, one of the twelve lesser prophets, whose prophecies are taken into the canon of the Old Testament. The name is written in the Hebrew with the *הבבב*, and signifies "a wrestler." There is no precise time mentioned in Scripture when this Habakkuk lived; but from his predicting the ruin of the Jews by the Chaldeans, it may be concluded that he prophesied before Zedekiah, or about the time of Manasseh. He is reported to have been the author of several prophecies which are not extant: but those that are indisputably his are contained in three chapters. In these the prophet complains very pathetically of the disorders which he observed in the kingdom of Judea. God reveals to him, that he would shortly punish them in a very terrible manner by the arms of the Chaldeans. He foretells the conquests of Nebuchadnezzar, his metamorphosis,

H A B

and death. He foretells, that the vast designs of Jehoiakim would be frustrated. He speaks against a prince (probably the king of Tyre) who built with blood and iniquity; and he accuses another king (perhaps the king of Egypt) of having intoxicated his friend, in order to discover his nakedness. The third chapter is a song or prayer to God, whose majesty he describes with the utmost grandeur and sublimity of expression.

HABAT, a province of Africa, in Barbary, and in the kingdom of Fez. It is surrounded by the Mediterranean, the Straits of Gibraltar, and the Atlantic Ocean. The principal towns are Arzilla, Tetuan, and Ceuta; which last is in possession of the Spaniards.

HABDALA, a ceremony of the Jews observed on the evening of the sabbath, when every one of the family is come home. At that time they light a taper or lamp, with two wicks at least. The master of the family then takes a cup, with some wine, mixed with fragrant spices, and having repeated a passage or two of scripture, as for example, "I will take the cup of salvation," &c. Psal. cxvi. and "The Jews had light and gladness," &c. Esth. viii. he blesses the wine and spices. Afterwards he blesses the light of the fire; and then casts his eyes on his hands and nails, as remembering that he is going to work. The whole is intended to signify, that the sabbath is over, and is from that moment divided from the day of labour which follows. For this reason the ceremony is called *Habdala*, which signifies "distinction." After the ceremony is over, and the company breaks up, they wish one another, not "a good night," but "a good week."

HABEAS CORPUS, in law, is the great remedy in cases of False IMPRISONMENT. The incapacity of the three other remedies referred to under that article, to give complete relief in every case, hath almost entirely antiquated them, and hath caused a general recourse to be had, in behalf of persons aggrieved by illegal imprisonment, to the present writ, the most celebrated in the English law. Of this there are various kinds made use of by the courts at Westminster, for removing prisoners from one court into another for the more easy administration of justice. Such is the *habeas corpus ad respondendum*, when a man hath a cause of action

against one who is confined by the process of some inferior court; in order to remove the prisoner, and charge him with this new action in the court above. Such is that *ad satisfaciendum*, when a prisoner hath judgment against him in an action, and the plaintiff is desirous to bring him up to some superior court to charge him with process of execution. Such also are those *ad prosequendum, testificandum, deliberandum, &c.*; which issue when it is necessary to remove a prisoner, in order to prosecute or bear testimony in any court, or to be tried in the proper jurisdiction wherein the fact was committed. Such is, lastly, the common writ *ad faciendum et recipiendum*, which issues out of any of the courts of Westminster-hall, when a person is sued in some inferior jurisdiction, and is desirous to remove the action into the superior court; commanding the inferior judges to produce the body of the defendant, together with the day and cause of his caption and detainer (whence the writ is frequently denominated an *habeas corpus cum causa*), to do and receive whatsoever the king's court shall consider in that behalf. This is a writ grantable of common right, without any motion in court; and it instantly supercedes all proceedings in the court below. But, in order to prevent the surreptitious discharge of prisoners, it is ordered by statute 1 & 2 P. & M. c. 13. that no *habeas corpus* shall issue to remove any prisoner out of any gaol, unless signed by some judge of the court out of which it is awarded. And, to avoid vexatious delays by removal of frivolous causes, it is enacted by statute 21 Jac. I. c. 23. that, where the judge of an inferior court of record is a barrister of three years standing, no cause shall be removed from thence by *habeas corpus* or other writ, after issue or demurrer deliberately joined: that no cause, if once remanded to the inferior court by writ of *procedendo* or otherwise, shall ever afterwards be again removed: and that no cause shall be removed at all, if the debt or damages laid in the declaration do not amount to the sum of five pounds. But an *expedient* having been found out to elude the latter branch of the statute, by procuring a nominal plaintiff to bring another action for five pounds or upwards (and then by the course of the court the *habeas corpus* removed both actions together), it is therefore enacted by statute 12 Geo. I. c. 29. that the inferior court may proceed in such actions as are under the value of five pounds, notwithstanding other actions may be brought against the same defendant to a greater amount.

But the great and efficacious writ, in all manner of illegal confinement, Judge Blackstone observes, is that of *habeas corpus ad subjiciendum*; directed to the person detaining another, and commanding him to produce the body of the prisoner, with the day and cause of his caption and detention, *ad faciendum, subjiciendum, et recipiendum*, to do, submit to, and receive whatsoever the judge or court awarding such writ shall consider in that behalf. This is a high prerogative writ, and therefore by the common law issuing out of the court of king's bench, not only in term-time, but also during the vacation, by a *fiat* from the chief justice, or any other of the judges, and running into all parts of the king's dominions: for the king is at all times entitled to have an account why the liberty of any of his subjects is restrained, wherever that restraint may be inflicted. If it issues in vacation, it is usually returnable before the judge himself who awarded it, and he proceeds by himself thereon; unless the term should intervene, and then it may be returned in court. Indeed, if the party were privileged in the courts of common pleas and exchequer, as being an officer or suitor of the court, an *habeas corpus ad subjiciendum* might also have been awarded from thence; and, if the cause of imprisonment were palpably illegal, they might have discharged him: but if he were committed for any criminal matter, they could only have remanded him, or taken bail for his appearance in the court of king's bench; which occasioned the common-pleas to discountenance

such applications. It hath also been said, and by very respectable authorities, that the like *habeas corpus* may issue out of the court of chancery in vacation: but upon the famous application to lord Nottingham by Jenks, notwithstanding the most diligent searches, no precedent could be found where the chancellor had issued such a writ in vacation; and therefore his lordship refused it.

In the court of king's-bench it was, and is still, necessary to apply for it by motion to the court, as in the case of all other prerogative writs (*certiorari, prohibition, mandamus, &c.*) which do not issue as of mere course, without showing some probable cause why the extraordinary power of the crown is called in to the party's assistance. For, as was argued by lord chief justice Vaughan, "it is granted on motion, because it cannot be had of course; and there is therefore no necessity to grant it: for the court ought to be satisfied that the party hath a probable cause to be delivered." And this seems the more reasonable, because, when once granted, the person to whom it is directed can return no satisfactory excuse for not bringing up the body of the prisoner. So that, if it issued of mere course, without showing to the court or judge some reasonable ground for awarding it, a traitor or felon under sentence of death, a soldier or mariner in the king's service, a wife, a child, a relation, or a domestic, confined for insanity or other prudential reasons, might obtain a temporary enlargement by suing out an *habeas corpus*, though sure to be remanded as soon as brought up to the court. And therefore Sir Edward Coke, when chief justice, did not scruple, in 13 Jac. I. to deny a *habeas corpus* to one confined by the court of admiralty for piracy; there appearing, upon his own showing, sufficient grounds to confine him. On the other hand, if a probable ground be shown, that the party is imprisoned without just cause, and therefore hath a right to be delivered, the writ of *habeas corpus* is then a writ of right, which "may not be denied, but ought to be granted to every man that is committed, or detained in prison, or otherwise restrained, though it be by the command of the king, the privy-council, or any other."

It has been shewn that the personal liberty of the subject is a natural inherent right, which cannot be surrendered or forfeited unless by the commission of some great and atrocious crime, and which ought not to be abridged in any case without the special permission of law: a doctrine coeval with the first rudiments of our constitution; and handed down to us from the Anglo-Saxons, notwithstanding all their struggles with the Danes, and the violence of the Norman conquest: asserted afterwards and confirmed by the conqueror himself and his descendants: and though sometimes a little impaired by the ferocity of the times, and the occasional despotism of jealous or usurping princes, yet established on the firmest basis by the provisions of *magna charta*, and a long succession of statutes enacted under Edward III. To assert an absolute exemption from imprisonment in all cases is inconsistent with every idea of law and political society; and in the end would destroy all civil liberty, by rendering its protection impossible: but the glory of the English law consists in clearly defining the times, the causes, and the extent, when, wherefore, and to what degree, the imprisonment of the subject may be lawful. This it is which induces the absolute necessity of expressing upon every commitment the reason for which it is made; that the court, upon an *habeas corpus*, may examine into its validity; and according to the circumstances of the case may discharge, admit to bail, or remand the prisoner.

And yet, early in the reign of Charles I. the court of king's-bench, relying on some arbitrary precedents (and those perhaps misunderstood), determined (State Trials, viii. 136) that they could not upon an *habeas corpus* either bail or deliver a prisoner, though committed without any cause assigned, in case he was

committed by the special command of the king, or by the lords of the privy-council. This drew on a parliamentary inquiry, and produced the *petition of right*, 3 Car. I. which recites this illegal judgment, and enacts that no freeman hereafter shall be so imprisoned or detained. But when, in the following year, Mr. Selden and others were committed by the lords of the council, in pursuance of his majesty's special command, under a general charge of "notable contempts and stirring up sedition against the king and government," the judges delayed for two terms (including also the long vacation) to deliver an opinion how far such a charge was bailable; and when at length they agreed that it was, they however annexed a condition of finding sureties for the good behaviour, which still protracted their imprisonment; the chief justice, Sir Nicholas Hyde, at the same time declaring, that "if they were again remanded for that cause, perhaps the court would not afterwards grant a *habeas corpus*, being already made acquainted with the cause of the imprisonment." But this was heard with indignation and astonishment by every lawyer present; according to Mr. Selden's own account of the matter, whose resentment was not cooled at the distance of four and-twenty years.

These pitiful evasions gave rise to the statute 16 Car. I. c. 10. § 8. whereby it is enacted, that if any person be committed by the king himself in person, or by his privy council, or by any of the members thereof, he shall have granted unto him, without any delay upon any pretence whatsoever, a writ of *habeas corpus*, upon demand or motion made to the court of king's bench or common-pleas; who shall thereupon, within three court days after the return is made, examine and determine the legality of such commitment, and do what to justice shall appertain, in delivering, bailing, or remanding such prisoner. Yet still in the case of Jenks, before alluded to, who in 1576 was committed by the king in council for a turbulent speech at Guildhall, new shifts and devices were made use of to prevent his enlargement by law; the chief justice (as well as the chancellor) declining to award a writ of *habeas corpus ad sub-jiciendum* in vacation, though at last he thought proper to award the usual writs *ad deliberandum*, &c. whereby the prisoner was discharged at the Old Bailey. Other abuses had also crept into daily practice, which had in some measure defeated the benefit of this great constitutional remedy. The party imprisoning was at liberty to delay his obedience to the first writ, and might wait, till a second and a third, called an *alias* and a *pluries*, were issued, before he produced the party: and many other vexatious shifts were practised to detain state-prisoners in custody. But whoever will attentively consider the English history, may observe, that the flagrant abuse of any power, by the crown or its ministers, has always been productive of a struggle; which either discovers the exercise of that power to be contrary to law, or (if legal) restrains it for the future. This was the case in the present instance. The oppression of an obscure individual gave birth to the famous *habeas corpus* act, 31 Car. II. c. 2. which is frequently considered as another *magna charta* of the kingdom; and by consequence has also in subsequent times reduced the method of proceeding on these writs (though not within the reach of that statute, but issuing merely at the common law) to the true standard of law and liberty.

The statute itself enacts, 1. That the writ shall be returned and the prisoner brought up, within a limited time, according to the distance, not exceeding in any case twenty days. 2. That such writs shall be endorsed, as granted in pursuance of this act, and signed by the person awarding them. 3. That on complaint and request in writing by or on behalf of any person committed and charged with any crime (unless committed for treason or felony expressed in the warrant, or for suspicion of the same, or as accessory thereto before the fact, or convicted or

charged in execution by legal process), the lord chancellor, or any of the twelve judges in vacation, upon viewing a copy of the warrant, or affidavit that a copy is denied, shall (unless the party has neglected for two terms to apply to any court for his enlargement) award a *habeas corpus* for such prisoner, returnable immediately before himself or any other of the judges; and upon the return made shall discharge the party, if bailable, upon giving security to appear and answer to the accusation in the proper court of judicature. 4. That officers and keepers neglecting to make due returns, or not delivering to the prisoner or his agent, within six hours after demand, a copy of the warrant of commitment, or shifting the custody of a prisoner from one to another without sufficient reason or authority (specified in the act), shall for the first offence forfeit 100*l.* and for the second offence 200*l.* to the party grieved, and be disabled to hold his office. 5. That no person, once delivered by *habeas corpus*, shall be recommitted for the same offence, on penalty of 500*l.* 6. That every person committed for treason or felony shall, if he requires it, the first week of the next term, or the first day of the next session of *oyer and terminer*, be indicted in that term or session, or else admitted to bail; unless the king's witnesses cannot be produced at that time: and if acquitted, or if not indicted and tried in the second term or session, he shall be discharged from his imprisonment for such imputed offence: but that no person, after the assizes shall be opened for the county in which he is detained, shall be removed by *habeas corpus*, till after the assizes are ended; but shall be left to the justice of the judges of assize. 7. That any such prisoner may move for and obtain his *habeas corpus*, as well out of the chancery or exchequer as out of the king's-bench or common-pleas; and the lord chancellor or judges denying the same, on sight of the warrant, or oath that the same is refused, forfeit severally to the party grieved the sum of 500*l.* 8. That the writ of *habeas corpus* shall run into the counties palatine, cinque ports, and other privileged places, and the islands of Jersey and Guernsey. 9. That no inhabitant of England (except persons contracting, or convicted praying to be transported; or having committed some capital offence in the place to which they are sent) shall be sent prisoner to Scotland, Ireland, Jersey, Guernsey, or any places beyond the seas, within or without the king's dominions: on pain that the party committing, his advisers, aiders, and assistants, shall forfeit to the party grieved a sum not less than 500*l.* to be recovered with treble costs; shall be disabled to bear any office of trust or profit; shall incur the penalties of *præmunire*; and shall be incapable of the king's pardon.

This is the substance of that great and important statute: which extends (we may observe) only to the case of commitments for such criminal charge as can produce no inconvenience to public justice by a temporary enlargement of the prisoner; all other cases of unjust imprisonment being left to the *habeas corpus* at common law. But even upon writs at the common law it is now expected by the court, agreeable to ancient precedents and the spirit of the act of parliament, that the writ should be immediately obeyed, without waiting for any *alias* or *pluries*; otherwise an attachment will issue. By these admirable regulations, judicial as well as parliamentary, the remedy is now complete for removing the injury of unjust and illegal confinement;—a remedy the more necessary, because the oppression does not always arise from the ill nature, but sometimes from the mere inattention, of government. For it frequently happens in foreign countries (and has happened in England during the temporary suspensions of the statute), that persons apprehended upon suspicion have suffered a long imprisonment, merely because they were forgotten.

HABERDASHER, in commerce, a seller of hats and other small wares. The matter and wardens of the company of haberdashers in London, calling to their assistance one of the com-

pany of cappers, and another of the hat-makers, and mayors, &c. of towns, may search the wares of all hatters who work hats with foreign wool, and who have not been apprentices to the trade, or who dye them with any thing but copperas and galls, or woad and madder: in which cases they are liable to penalties by stat. 8 Eliz. cap. 7. and 5 Geo. II. cap. 22. For the etymology of this denomination, see BERDASH.

HABERGION, or **HAUBERGEON**, **HABERGETUM**, a coat of mail; an ancient piece of defensive armour, in form of a coat, descending from the neck to the middle, and formed of little iron rings or meshes, linked into each other. The word is also written *haberge*, *hauberge*, *haubere*, *haubert*, *hautber*, *boutbert*, and *hauberk*. Spelman takes it to have been formed from the ancient French *bault*, "high," and *berg*, "armour, covering;" as serving to defend the upper part of the body. Du Cange and Skinner choose to derive it from the Belgic *bals*, or Teutonic *balts*, "neck," and *bergen*, "to cover;" as if it were a peculiar defence for the neck. Others will have it formed of *al*, *alli*, q. d. *all*, and *bergen*, "to cover;" as importing it a cover for the whole body.

HABICOT (Nicholas), a celebrated surgeon, born at Ponny in Gatinois, acquired great reputation by his skill in his profession, and by his writings; and died in 1624. He wrote a treatise on the plague, and several other curious works.

HABINGTON (William), an English poet and historian, was the son of Thomas Habington, Esq. He was born in 1605, at Hendlip in Worcestershire; and was educated at St. Omers and at Paris. He died in 1654, and left several manuscripts in the hands of his son. His printed works are, 1. Poems under the title of *Castura*. 2. The Queen of Arragon, a tragic comedy. 3. Observations upon History. 4. The History of Edward IV. King of England, written and published at the desire of Charles I. This work is composed in a very florid style.

HABIT, in philosophy, an aptitude or disposition either of mind or body, acquired by a frequent repetition of the same act. See *CUSTOM and Habit*.

HABIT is also used for a dress or garb, or the composition of garments, wherewith a person is covered. The principal part of the dress worn by the Jews and Greeks was the *μαλινον* and the *χιτων*. The *μαλινον* was an upper garment, consisting of a loose square piece of cloth wrapped round the body; the *χιτων* was an under garment, or tunic, which was fastened round the body and embraced it closely, falling down to the mid-thigh. It is proper in this place to observe, that a person divested of this upper garment or *μαλινον*, in the eastern language, is styled *naked*, and in this sense David danced naked before the ark. The several sorts of garments in use with both sexes, amongst the Romans, were the toga, tunica, peluna, lacerna, chlamys, paludamentum, læna, stola, pallium or palla. See *TOGA*, &c. For the habits of the priests amongst the Jews, Greeks, and Romans, see the article *PRIESTS*.

HABIT is particularly used for the uniform garments of the religious, conformable to the rule and order whereof they make profession: as the habit of St. Benedict, of St. Augustine, &c. In this sense we say absolutely, such a person has taken the habit; meaning he has entered upon a noviciate in a certain order. So he is said to quit the habit when he renounces the order. See *VOW*. The habits of the several religious are not supposed to have been calculated for singularity or novelty: the founders of the orders, who were at first chiefly inhabitants of deserts and solitudes, gave their monks the habit usual among the country people. Accordingly, the primitive habits of St. Anthony, St. Hilarion, St. Benedict, &c. are described by the ancient writers as consisting chiefly of sheep skins, the common dress of the peasants, shepherds, and mountaineers, of that time; and the same they gave to their disciples.

The orders established in and about cities and inhabited places took the habit worn by other ecclesiastics at the time of their institution. Thus, St. Dominic gave his disciples the habit of regular canons, which he himself had always worn to that time. And the like may be said of the Jesuits, Barnabites, Theatins, Oratorians, &c. who took the common habit of the ecclesiastics at the time of their foundation. And what makes them differ so much from each other, as well as from the ecclesiastical habit of the present times, is, that they have always kept invariably to the same form; whereas the ecclesiastics and laics have been changing their mode on every occasion.

HABITUDE, among schoolmen, the respect or relation one thing bears to another. See *RELATION*.

HABSBURG, or **HAPSBERG**, an ancient castle of Switzerland, in the canton of Bern. It is the place where the ancient counts of Hapsburg resided, and is seated near the lake of Lucern, and to the east of the town of that name. E. lon. 8. 10. N. lat. 47. 22.

HACHA, a sea port town of South America, in Terra Firma, seated at the mouth of a river of the same name. Here the Spanish galleons touch at their arrival in South America, from whence expresses are sent to all the settlements to give them notice of it. W. lon. 72. S. N. lat. 11. 30.

HACKET (John), bishop of Lichfield and Coventry, was born in 1592. In 1623 he was made chaplain to James I. and prebendary of Lincoln; and soon after obtained the rectory of St. Andrew's, Holborn, with that of Cheam in Surry; his patron telling him he intended Holborn for wealth, and Cheam for health. In 1642 he was presented to a prebendary and residentiary; but was deprived of the enjoyment of them, as well as of St. Andrew's, by the ensuing troubles. He then lived retired at Cheam with little disturbance, until he recovered his preferments by the restoration of Charles II. by whom he was preferred to the see of Lichfield and Coventry in 1661. Finding the beautiful cathedral of Lichfield almost battered to the ground, he in eight years finished a complete church superior to the former, at his own expence of 20,000l. excepting 1000l. he had from the dean and chapter, with what he could procure from private benefactors. He laid out 1000l. on a prebendal house, his palaces at Lichfield and Eccleshall having been demolished during the civil wars: and, beside these acts of munificence, left several other benefactions at his death in 1670. He published, before he entered into orders, a comedy intitled *Loyola*, which was twice acted before king James the First. After his death there appeared a "Century of his sermons on several remarkable subjects," in folio; and "The Life of Archbishop Williams," in folio, which was abridged in 1700 by Ambrose Philips.

HACKNEY, a parish of Middlesex, on the north-east side of London, containing no less than 12 hamlets. At the bottom of Hackney-Marsh, through which the river Lea runs, between Old-Ford and the Wyck, there have been discovered the remains of a great stone causeway, which, by the Roman coins, &c. found there, was no doubt one of the famous highways made by the Romans. The old church is of a very ancient foundation, so old as Edward II. and the number of houses above 800. That part next London is called *Maré Street*; the middle, *Church Street*; and the north part *Clapton*; Dorleston and Shacklewell are on the west, and Hommerton, which leads to the Marsh, on the east. Here are three meeting-houses and several boarding-schools, besides the free-school in the church-yard, a charity-school, and 17 almshouses. It was from this place that the coaches let to the people in London first received their name; for in the last century, many people having gone on visits to see their friends at Hackney, it occasioned them often to hire horses or carriages, so that in time it became a common name for such horses, coaches, and chairs, as were let to the people of Lon-

don; and the name is now general through Britain and Ireland. A large church has been lately built near the old one.

HACKNEY-Coaches, those exposed to hire in the streets of London, and some other great towns and cities, as Edinburgh, Liverpool, Bristol, &c. at certain rates fixed by authority. See **COACH**. These first began to ply in the streets of London, or rather waited at inns, in the year 1625, and were originally no more than 20 in number. The following is an abstract of the several acts of parliament relating to hackney-coaches in London.

The king may appoint a number of commissioners, not exceeding five, to license and regulate hackney-coaches within the cities of London and Westminster, the suburbs thereof, and other places within the bills of mortality, not exceeding 1000, every proprietor paying ten shillings per week by monthly payments. This however includes the additional duty of five shillings per week, which took place in 1784.

Every coach shall have its number on each side; and if any proprietor shall presume to alter his number, he shall forfeit 5l. half to the king, and half to the informer. The horses to be used with hackney-coaches shall not be under 14 hands high.

No person shall drive or let to hire any hackney-coach without licence, on pain of 5l. and from and after the 4th of September 1784, if any person shall drive a mourning coach or hearse to any funeral within the cities of London and Westminster, or the suburbs thereof, or within five miles of Temple Bar, without a licensed number fixed on its fore-standard, he shall be liable to a penalty of 5l.

Any coachman plying for hire, may be obliged, on every day of the week, to go at reasonable times any where within the distance of ten miles from the city of London or Westminster; and if he has not a cheque string, placed in a proper part of his coach, he shall forfeit five shillings. If the owners of hackney-coaches, or their proper drivers, neglect to attend the commissioners upon the third summons, they forfeit their licence.

From and after the 1st of August 1786, the several rates or fares formerly paid, were repealed, and the following are now substituted in their stead.

	Miles.	s.	d.
For any distance not exceeding -	-	1 $\frac{1}{4}$	— 1 0
Do. above 1 $\frac{1}{4}$ mile and not exceeding -	-	2	— 1 6
Do. above 2 miles and not exceeding -	-	2 $\frac{1}{2}$	— 2 0
Do. above 2 $\frac{1}{2}$ miles and not exceeding -	-	3	— 2 6
Do. above 3 miles and not exceeding -	-	3 $\frac{1}{2}$	— 3 0
Do. above 3 $\frac{1}{2}$ miles and not exceeding -	-	4	— 3 6
Do. above 4 miles and not exceeding -	-	4 $\frac{1}{2}$	— 4 0
Do. above 4 $\frac{1}{2}$ miles and not exceeding -	-	5	— 4 6

And so on to the extent of 10 miles from London or Westminster, at the rate of sixpence for each additional half mile, the last of which is to be paid if entered upon.

If the coach is kept in waiting, or paid by time, the fares will be—

	s.	d.
For any time not exceeding 3 quarters of an hour -	1	0
From 3 quarters of an hour and not exceeding 1 hour -	1	6
From 1 hour 00 min. - to 1 hour 20 min. -	2	0
From 1 hour 20 min. - to 1 hour 40 min. -	2	6
From 1 hour 40 min. - to 2 hours 00 min. -	3	0
From 2 hours 00 min. - to 2 hours 20 min. -	3	6
From 2 hours 20 min. - to 2 hours 40 min. -	4	0
From 2 hours 40 min. - to 3 hours 00 min. -	4	6
From 3 hours 00 min. - to 3 hours 20 min. -	5	0
From 3 hours 20 min. - to 3 hours 40 min. -	5	6
From 3 hours 40 min. - to 4 hours 00 min. -	6	0
From 4 hours 00 min. - to 4 hours 20 min. -	6	6
From 4 hours 20 min. - to 4 hours 40 min. -	7	0
From 4 hours 40 min. - to 5 hours 00 min. -	7	6

And so on for any additional time at the rate of sixpence for every 20 minutes; the last of which is to be paid for if entered upon.

For a day of 12 hours - - - 14 6

For any time after the said 12 hours the coach is to be considered as a coach in waiting, and paid for accordingly.

All the space betwixt the stand and the taking up of the fare is to be reckoned into the fare, and the coachman is at liberty to take either for the length of ground or time, but not for both; nor can he charge more than one shilling for any time within the first 3 quarters of an hour, unless he has gone above one mile and a quarter; his stopping and waiting at various places, driving slow by desire, or returning from whence he came, make no addition to the fare.

Any coachman refusing to go at, or exacting more for his hire than according to the foregoing rates, shall forfeit a sum not exceeding 3l. or under 10s. and in case of misbehaviour by abusive language or otherwise, the commissioners may revoke his licence, or inflict a penalty not exceeding 3l. to the poor, and on non-payment, to be committed and kept to hard labour for 30 days.

Any person refusing to pay the fare, or defacing the coach, may be brought by warrant before any justice, who, on proof upon oath, may award satisfaction to the party; and in case of refusal to pay, may bind him over to the next sessions.

Rents and penalties to be levied by distress, and, in default thereof, imprisonment till paid; and if any rent is fourteen days unpaid, the licence may be withdrawn.

A coach should be taken *possession* of, before the coachman is told where to drive; if he then refuses to proceed he is liable to be punished; and if at any time you apprehend that more than the proper fare is demanded, you may offer whatever is asked, but charge the coachman to take no more than is due; and if he then persists in the overcharge and takes it, you may take his number and apply for redress at the hackney coach office, in Somerset-place; though the penalties are equally recoverable before the Alderman of every ward of the city, or any justice of peace.

The duty arising from licences to hackney coaches and chairs in London forms a branch of the national revenue.

HADDINGTON, a populous borough of Scotland, in the county of the same name. It is seated on the Tyne, to the inundations of which it has been sometimes subject. The Franciscan monastery here has been a very handsome building. Part of it is occupied as a parish church. At a small distance are the ruins of a nunnery, founded in 1178. Haddington is 18 miles E. of Edinburgh. Lon. 3. 39. W. Lat. 55. 58. N.

HADDINGTONSHIRE, or **EAST LOTHIAN**, a county of Scotland, bounded on the W. by Edinburghshire, on the N. by the fiith of Forth, on the E. by the German Ocean, and on the S. by the county of Berwick. It is about 25 miles long from E. to W. and 15 miles where broadest. A great tract of this county, extending to the S. and E. is for the most part champaign, and very fertile and beautiful. The soil is, in many places, doubly productive. Rich crops are raised on the surface; and the mines of coal are inexhaustible. The southern part of this county is very mountainous, comprehending the N. side of Lammermuir Hills. These high grounds, however, feed many sheep.

HADDOCK, the English name of a species of *GADUS*.

HADDON (Dr. Walter), a great restorer of the learned languages in England, was born in 1516. He distinguished himself particularly by writing Latin in a fine style, which he acquired by constantly studying Cicero. He was a strenuous promoter of the reformation under king Edward; and was therefore thought a proper person to succeed bishop Gardiner in

the mastership of Trinity-hall, Cambridge, on his deprivation. He lay concealed during the reign of queen Mary; but acquired the favour of Elizabeth, who constituted him one of the masters of the court of requests, and sent him one of the three agents to Bruges in 1566, to restore commerce between England and the Netherlands. He was also engaged, with Sir John Cheke, in drawing up in Latin that useful code of ecclesiastical law, published in 1571 by the learned John Fox, under the title of *Reformatio legum ecclesiasticarum*; his other works are collected and published under the title of *Lucubrations*. He died in 1572.

HADERSLEBEN, a sea-port town of Denmark, in the duchy of Sleswick, with a strong citadel, built upon a small island. It is seated on a bay of the Baltic Sea, and has a well-frequented harbour. E. lon. 9. 35. N. lat. 55. 24.

HADES, in the scriptures, is used in various senses. Sometimes it signifies the invisible regions of the dead, sometimes the place of the damned, and sometimes the grave. In Greek authors, it is used to signify, in general, the regions of the dead. See HELL.

HADHRAMUT, a town and province of Arabia Felix, 115 miles W. of Careßen. Lon. 45. 30. E. Lat. 15. 0. N.

HADLEY, a large town in Suffolk, with a market on Monday. It is seated on the river Preston, and has a very handsome church. Large quantities of yarn are spun here for the Norwich manufacture; and this town had once a considerable woollen manufactory, which is now decayed. It is 20 miles S. E. of Bury, and 64 N. E. of London. Lon. 1. 6. E. Lat. 52. 10. N.

HÆMAGOGOS, among the old physicians, a compound medicine, consisting of fetid and aromatic simples mixed with black hellebore, and prescribed in order to promote the menstrua and hæmorrhoidal fluxes; as also to bring away the lochia.

HÆMANTHUS, the BLOOD-FLOWER; a genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the ninth order, *Spatheæ*. The involucrium is hexaphyllous and multiflorous; the corolla sexpartite superior; the berry trilocular. The species are, 1. The *coccineus*, with plain tongue-shaped leaves, rises about a foot high, with a stalk supporting a cluster of bright red tubulous flowers. It hath a large bulbous root, from which in the autumn come out two broad flat leaves of a fleshy consistence, shaped like a tongue, which turn backward on each side, and spread on the ground, so that they have a strange appearance all the winter. In the spring these decay; so that from May to the beginning of August they are destitute of leaves. The flowers are produced in the autumn just before the leaves come out. 2. The *carinatus*, with keel-shaped leaves, has a taller stalk and paler flowers than the former; its leaves are not flat, but hollowed like the keel of a boat. 3. The *juniceus*, with large spear-shaped waved leaves, grows about a foot high, and hath flowers of a yellowish red colour. These are succeeded by berries, which are of a beautiful red colour when ripe. All these plants are natives of the Cape of Good Hope, and do not propagate very fast in Europe, their roots seldom putting forth many off-sets. The best method of managing them is to have a bed of good earth in a bricked pit, where they may be covered with glasses, and in hard frosts with mats and straw. The earth in the frame should be two feet deep, and the frame should rise two feet above the surface, to allow height for the flower-stems to grow. The roots should be planted nine or ten inches asunder; and in winter, if they are protected from frost, and not suffered to have too much wet, but in mild weather exposed to the air, they will flower every year, and the flowers will be much stronger than with any other management. The third sort requires to be constantly kept in a dry stove.

HÆMATITES, or BLOOD-STONE, a hard mineral substance, red, black, or purple, but the powder of which is always red. It is found in masses sometimes spherical, semi-spherical, pyramidal, or cellular, that is, like a honeycomb. It contains a large quantity of iron. Forty pounds of that metal have been extracted from a quintal of stone; but the iron is of such a bad quality, that this ore is not commonly smelted. The great hardness of hæmatites renders it fit for burnishing and polishing metals.

HÆMATOPUS, the SEA-PYE, in ornithology, a genus belonging to the order of grallæ. The beak is compressed, with an equal wedge-shaped point; the nostrils are linear; and the feet have three toes without nails. There is but one species, viz. the ostralegus, or oyster-catcher, a native of Europe and America. See plate 3. It feeds upon shell-fish near the sea-shore, particularly oysters, and limpets. On observing an oyster which gapes wide enough for the insertion of its bill, it thrusts it in, and takes out the inhabitant: it will also force the limpets from their adhesion to the rocks with sufficient ease. Occasionally, it feeds on marine insects and worms. With us these birds are often seen in considerable flocks in winter: in the summer they are met with only in pairs, though chiefly in the neighbourhood of the sea or salt rivers. The female lays four or five eggs, on the bare ground, on the shore, above high-water mark: they are of a greenish grey, blotched with black. The young are said to be hatched in about three weeks. These birds are rather wild when in flocks; yet are easily brought up tame, if taken young.

HÆMATOXYLUM, LOGWOOD, or *Campeachy Wood*; a genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 33d order, *Lomentaceæ*. The calyx is quinquepartite; the petals five; the capsule lanceolated; unilocular, and bivalved; the valves navicular or keeled like a boat. Of this genus there is only one species, viz. the *campechianum*, which grows naturally in the bay of Campeachy at Honduras, and other parts of the Spanish West Indies, where it rises from 16 to 24 feet high. The stems are generally crooked, and very deformed; and seldom thicker than a man's thigh. The branches, which come out on each side, are crooked, irregular, and armed with strong thorns, garnished with winged leaves, composed of three pair of obscure lobes indented at the top. The flowers come in a racemus from the wings of the leaves, standing erect, and are of a pale yellowish colour, with a purple empalement. They are succeeded by flat oblong pods, each containing two or three kidney-seeds. Dr. Wright informs us, that this tree was introduced into Jamaica from Honduras in 1715; and is at this time too common, as it has overrun large tracts of land, and is very difficult to root out. It makes a beautiful and strong fence against cattle. If pruned from the lower branches, it grows to a sizeable tree, and, when old, the wood is as good as that from Honduras. The trees are cut up into billets or junks, the bark and white sap of which are chipped off, and the red part, or heart, is sent to England for sale.

Logwood is used in great quantities for dyeing purple, but especially black colours. All the colours, however, which can be prepared from it, are of a fading nature, and cannot by any art be made equally durable with those prepared from some other materials. Of all the colours prepared from logwood, the black is the most durable. Dr. Lewis recommends it as an ingredient in making ink. "In dyeing cloth (says he), vitriol and galls, in whatever proportions they are used, produce only browns of different shades: I have often been surprised that with these capital materials of the black dye I never could obtain any true blackness in white cloth, and attributed the failure to some unheeded mismanagement in the process, till I found it to be a known fact among the dyers. Logwood is the material

which adds blackness to the vitriol and gall-brown; and this black dye, though not of the most durable kind, is the most common. On blue cloth a good black may be dyed by vitriol and galls alone; but even here, an addition of logwood contributes not a little to improve the colour." Mr. Delaval, however, in his Essay on Colours, informs us, that with an infusion of galls and iron-silings, he not only made an exceeding black and durable ink, but also dyed linen cloth of a very deep black. See COLOUR-Making; DYEING, p. 112; and INK. Logwood is also found to have a considerable astringent virtue as a medicine, and an extract of it is sometimes given with great success in diarrhœas.

HÆMOPYSIS, HÆMPTYSIS, or HÆMPTOE'; a spitting of blood. See MEDICINE.

HÆMORRHAGY, compounded of *αἷμα* "blood," and *ῥέω* "I burst forth," in medicine, a flux of blood at any part of the body; arising either from a rupture of the vessels, as when they are too full or too much pressed; or from an erosion of the same, as when the matter of an abscess becomes corrosive. The hæmorrhagy, properly speaking, as understood by the Greeks, was only a flux of blood at the nose; but the moderns extend the name to any kind of flux of blood, whether by the nose, mouth, lungs, stomach, intestines, fundament, matrix, or any other part. See MEDICINE and SURGERY.

HÆMORRHOIDAL, an appellation given by anatomists to the arteries and veins of the intestinum rectum.

HÆMORRHOIDS, or **PILES**, an hæmorrhage or issue of blood from the hæmorrhoidal vessels. See SURGERY.

HÆMUS, in ancient geography, a vast ridge, running from Illyricum towards the Euxine, (Pliny); so high as to afford a prospect both of the Euxine and Adriatic. Here, in after ages, was constituted a province called *Hæmimons* or *Hæmimontus*.

HÆRETICO COMBURENDO, a writ which anciently lay against an heretic, who, having once been convicted of heresy by his bishop, and having abjured it, afterwards falling into it again, or into some other, is thereupon committed to the secular power. This writ is thought by some to be as ancient as the common law itself; however, the conviction of heresy by the common law was not in any petty ecclesiastical court, but before the archbishop himself in a provincial synod, and the delinquent was delivered up to the king to do with him as he pleased: so that the crown had a control over the spiritual power. But by 2 Hen. IV. cap. 15. the diocesan alone, without the intervention of a synod, might convict of heretical tenets; and unless the convict abjured his opinions, or if after abjuration he relapsed, the sheriff was bound *ex officio*, if required by the bishop, to commit the unhappy victim to the flames, without waiting for the consent of the crown. This writ remained in force, and was actually executed on two Anabaptists in the seventh of Elizabeth, and on two Arians in the ninth of James I. Sir Edward Coke was of opinion, that this writ did not lie in his time; but it is now formally taken away by statute 29 Car. II. cap. 9. But this statute does not extend to take away or abridge the jurisdiction of Protestant archbishops or bishops, or any other judges of any ecclesiastical courts, in cases of atheism, blasphemy, heresy, or schism, and other damnable doctrines and opinions; but they may prove and punish the same according to his majesty's ecclesiastical laws, by excommunication, deprivation, degradation, and other ecclesiastical censures, not extending to death, in such sort and no other, as they might have done before the making of this act. Sec. 2. See HERESY.

HÆRLEM. See HARLEM.

HAG, in zoology. See MYXINE.

HAGARENS, the descendants of Ishmael. They are called also *Ishmaelites* and *Saracens*; and lastly, by the general name of *Arabians*. As to the Hagarens, they dwell in Arabia the

Happy, according to Pliny. Strabo joins them with the Nabathæans, and Chavlotæans, whose habitation was rather in Arabia Deserta. Others think their capital was Petra, otherwise Agra, and consequently they should be placed in Arabia Petraea. The author of the lxxxiii^d Psalm, ver. 6. joins them with the Moabites; and in the Chronicles it is said (1 Chr. v. 10.), that the sons of Reuben, in the time of Saul, made war against the Hagarens, and became masters of their country eastward of the mountains of Gilead. This therefore was the true and ancient country of the Hagarens. When Trajan came into Arabia, he besieged the capital of the Hagarens, but could not take it. The sons of Hagar valued themselves of old upon their wisdom, which appears by Baruch iii. 23.

HAGEDORN (Frederick de), a celebrated German poet, was born at Hamburgh, where his father was resident for the king of Denmark, in 1708. He finished his studies at Jena; and in 1728 published a number of poetical pieces in Germany, which were well received. He afterwards came to England, where he obtained the friendship of many of the learned; and, at his return, was made secretary to the English Hamburgh company, a lucrative employment that left him sufficient time for cultivating the Muses. In 1738 he published his Fables and Tales, the first collection of the kind of which Germany can boast. He afterwards published other pieces of poetry of different kinds, as Moral Poems, Epigrams, and five books of Songs: which of all his poetical pieces are most esteemed. He died in 1754.

HAGGAI, the tenth of the small prophets, was born, in all probability, at Babylon, in the year of the world 3457, from whence he returned with Zerubbabel. It was this prophet who by command from God (Ezra v. 1, 2, &c.) exhorted the Jews, after their return from the captivity, to finish the rebuilding of the temple, which they had intermitted for 14 years. His remonstrances had their effect; and to encourage them to proceed in the work, he assured them from God, that the glory of this latter house should be greater than the glory of the former house; which was accordingly fulfilled, when Christ honoured it with his presence: for with respect to the building, this latter temple was nothing in comparison of the former. We know nothing certain of Haggai's death. The Jews pretend, that he died in the last year of the reign of Darius, at the same time with the prophets Zechariah and Malachi, and that thereupon the spirit of prophecy ceased among the children of Israel. Epiphanius will have it, that he was buried at Jerusalem among the priests. The Greeks keep his festival on the 16th of December, and the Latins on the 4th of July.

HAGIOGRAPHIA, a name given to part of the books of scripture, called by the Jews *Cetuvim*. The word is compounded of *ἅγιος* "holy;" and *γράφω* "I write." The name is very ancient: St. Jerom makes frequent mention of it: before him, St. Epiphanius called these books simply *ῥαφαια*. The Jews divide the sacred writings into three classes: The Law, which comprehends the five books of Moses: The Prophets, which they call *Nevim*: And the *Cetuvim* כְּתוּבִים, called by the Greeks, &c. *Hagiographa*: comprehending the book of Psalms, Proverbs, Job, Daniel, Ezra, including also the book of Nehemiah, Chronicles, Canticles, Ruth, the Lamentations, Ecclesiastes, and Esther. The Jews sometimes call these books the *Writings*, by way of eminence, as being written by immediate inspiration of the Holy Spirit. Thus says Kimchi, in his preface to the Psalms, Maimonides, in More Nevoch, and Elias Levita in his Thibbi, under the word כְּתוּבִים. They distinguish the *bagiographers*, however, from the Prophets; in that the authors of the former did not receive the matters contained in them by the way called *Prophecy*, which consists in dreams, visions, whispers, ecstasies, &c. but by mere inspiration and direction of the Spirit.

HAGUE, a town of the United Provinces, in Holland, situated in E. lon. 4. 10 N. lat. 48. 49. In Latin it is called *Haga Comitis*; in French, *La Haye*; in Dutch, *der Haag*, or *'S Graavenhage*, i. e. the Earl's Grove or Wood, from the wood near which it is built, and in which the earls of Holland had a country-house. Though it sends no deputies to the states, it is one of the most considerable towns in Holland, pleasantly situated, and exceedingly beautiful. It may indeed compare with almost any city in Europe, though geographers account it but a village. The inhabitants also breathe a better air than those of the other cities, as it stands on a dry soil, somewhat higher than the rest of the country. It has no gates or walls, but is surrounded by a moat over which there are many draw-bridges. Two hours are required to walk round it, and it contains about 40,000 or 50,000 souls. It is a place of much splendor and business, being the seat of the high colleges of the republic and province of Holland, and the residence of the stadtholder and foreign ambassadors; and there are a great many fine streets and squares in it. In the inner court all the high colleges and courts of justice hold their assemblies: there likewise the foot-guards do duty, as the horse-guards in the outer, when the states are sitting. De Plaats is an open airy place, in form of a triangle, adorned with neat and beautiful buildings: the Vyverberg is an eminence, laid out into several fine shady walks, with the Vyver, a large basin of water, at the bottom: the Voorhout is the most celebrated part of the Hague, and consists of the mall, and three ways for coaches on each side, planted with trees, being much the same as St. James's park at London: the palace of Opdam, or Wassenaar, is built in a very elegant taste: the prince and princess's grafts are fine streets: the Plan, in Dutch *Het Pleyn*, is a beautiful grove, laid out in several cross walks, and surrounded with stately houses. The Jewish synagogue is well worth being seen by a curious traveller; and also the palaces of the prince of Orange, the hotel of Spain, the new Voorhout, the mausoleum of the baron of Opdam in the great church, and the several hospitals. The environs of the Hague are exceedingly pleasant. Among other agreeable objects are the wood, with the palace of Orange at the extremity of it, called the *house in the wood*; the village of Scheveling; and the sand-hills, along the north sea; with the village of Voorburg, and the charming seats and fine gardens round it. Two miles from the Hague is Ryswick, a village: and a quarter of a mile from that, a noble palace belonging to the prince of Orange, famous for the treaty of peace concluded there in 1697. Loosduynen, where Margaret, countess of Henneburg, and daughter of Florence IV. count of Holland and Zealand, is said to have been delivered of 365 children at a birth in 1276, is about five miles from the Hague. Five miles beyond Loosduynen, and not far from the beautiful village of Gravesande, is Honstladyck, another palace belonging to the prince of Orange, and one of the finest structures in the Low Countries.

HAGUENAU, a town of France, in the department of Lower Rhine and late province of Alsace. It was formerly a free imperial city; but it was taken by the French in 1673. The great general Montecuculi was obliged to raise the siege of it in 1675. It was several times taken and retaken in the subsequent wars; the last of all by the French in 1706. It is seated on the river Motter, which divides it into two parts, 12 miles N. of Strasbourg, and 255 E. of Paris. Lon. 7. 53. E. Lat. 48. 47. N.

HAHN (Simon Frederick), a celebrated German historian. At ten years of age he was not only far advanced in the Latin, but understood several living languages. Four years after, he pronounced a speech on the origin of the cloister at Bergen, the place of his birth, which was printed with some other pieces; and in 1708 he published a Continuation of Meibomius's Chronicle of Bergen. After having for several years given public

lectures at Hall, he became, at the age of 24, professor of history at Helmstadt; and was at length counsellor, historiographer, and librarian, to the king of Great Britain, elector of Hanover. He died in 1729, aged 37. Besides the above, and some other works, he wrote, 1. The first volume of the History of the Empire. 2. *Collectio monumentorum veterum et recentium ineditorum*, 2 vols. 8vo.

HAI-TANG, a beautiful Chinese shrub, originally brought from the bottom of the rocks which border the sea-coast. It has been cultivated in China for more than 14 centuries; and is celebrated as often in the works of the Chinese poets, as roses and lilies are in those of ours. Painters and embroiderers ornament almost all their works with its foliage and flowers. The stalk of the hai-tang is of a cylindric form, and shoots forth a number of branches of a purple tint towards their bases, and full of knots, which are also of a purple colour round the edges. It produces a number of shoots, the tallest of which are about two feet and a half in height. Its leaves (which are much indented, of an oval form towards the stalk, pointed at their upper extremities, and full of small prickles) grow almost opposite one another on the branches, and at the same distance as the knots. Their colour above is a deep-green; that below is much lighter, and almost effaced by their fibres, which are large, and of a delicate purple: all these leaves together have a beautiful effect to the eye. The flowers grow in bunches at the extremities of the branches. Each flower is composed of four petals, two great and two small, resembling in colour the bloom of a peach-tree, and which have almost the same figure as the blossom of our cherry-trees. The two large are cemented one upon the other, in the form of a purse; and when they blow, the two small blow also in their turn; and then the whole four represent a cross. The pistil is composed of very bright yellow grains, which separate gradually one from another by the lengthening of the filaments to which they adhere; they then open into little bells, and compose a small yellow tuft, supported by a slender stalk, which rises above the petals. The calyx, which sustains each of the flowers, is composed of two purple-coloured leaves, united in form of a purse. In proportion as the flowers grow and increase in size, the two leaves of the calyx open, become pale and dry, and drop off. The flowers, supported by small stalks, separate one from the other, and produce of themselves other flowers, which rise up from a new calyx. This plant is *propagated* from seed, but with difficulty. It thrives best in a sandy soil; dung or mould destroys it; and great care must be taken to refresh it only with the purest water. As it cannot endure the sun in any season, it is always planted below walls that are exposed to the north. It generally begins to flower about the end of August. After it has produced seed, all its branches are cut; and it commonly shoots forth new ones before the spring following; but it is necessary to heap up gravel and pieces of brick round its roots, to prevent them from rotting. Notwithstanding all the care that is taken to cultivate this tree at Peking, it does not thrive so well there as in the southern provinces. The smell of its leaves has an affinity both to that of the rose and the violet; but it is weaker, and never extends to any great distance.

HAIL, in natural history, a meteor generally defined frozen rain, but differing from it in that the hailstones are not formed of single pieces of ice, but of many little spherules agglutinated together. Neither are these spherules all of the same consistence; some of them being hard and solid like perfect ice; others soft, and mostly like snow hardened by a severe frost. Sometimes the hailstone hath a kind of core of this soft matter; but more frequently the core is solid and hard, while the outside is formed of a softer matter. Hailstones assume various figures, being sometimes round, at other times pyramidal, crenated, angular, thin, and flat,

and sometimes stellated, with six radii like the small crystals of snow.

Natural historians furnish us with various accounts of surprising showers of hail, in which the hailstones were of extraordinary magnitude. Mezeray, speaking of the war of Louis XII. in Italy, in the year 1510, relates, that there was for some time an horrible darkness, thicker than that of night; after which the clouds broke into thunder and lightning, and there fell a shower of hailstones, or rather (as he calls them) pebblestones, which destroyed all the fish, birds, and beasts of the country. It was attended with a strong smell of sulphur; and the stones were of a blueish colour, some of them weighing an hundred pounds. *Ilist. de France*, tom. II. p. 339.

At Little in Flanders in 1686, fell hailstones of a very large size; some of which contained in the middle a dark-brown matter, which, thrown on the fire, gave a very great report, Phil. Transf. No. 203.

Dr. Halley and others also relate, that in Cheshire, Lancashire, &c. April 29, 1697, a thick black cloud coming from Carnarvonshire, disposed the vapours to congeal in such a manner, that for about the breadth of two miles, which was the limit of the cloud, in its progress for the space of 60 miles, it did inconceivable damage; not only killing all sorts of fowls and other small animals, but splitting trees, knocking down horses and men, and even ploughing up the earth; so that the hailstones buried themselves under ground an inch or an inch and a half deep. The hailstones, many of which weighed five ounces, and some half a pound, and being five or six inches about, were of various figures; some round, others half round; some smooth, others embossed and crenated: the icy substance of them was very transparent and hard, but there was a snowy kernel in the middle of them.

In Hertfordshire, May 4, the same year, after a severe storm of thunder and lightning, a shower of hail succeeded, which far exceeded the former: some persons were killed by it, their bodies beat all black and blue; vast oaks were split, and fields of rye cut down as with a scythe. The stones measured from 10 to 13 or 14 inches about. Their figures were various, some oval, others picked, and some flat. *Philosoph. Transf.* No. 229.

It is remarkable, that, so far as we know, hail is a meteor which never produces any beneficial effect. The rain and dew invigorate and give life to the whole vegetable tribe; the frost, by expanding the water contained in the earth, pulverises and renders the soil fertile; snow covers and preserves the tender vegetables from being destroyed by too severe a frost. But hail does none of all these. In winter, it lies not sufficiently close to cover vegetables from the nipping frosts; and in spring and summer it not only has a chilling and blasting effect from its coldness, but often does great damage to the more tender plants by the weight of the stones, and in great hail-storms the damage done in this manner is prodigious.

Hail is one of the natural phenomena for which it is almost impossible to account in any satisfactory manner. It is certain, that on the tops of mountains, hailstones, as well as drops of rain, are very small, and continually increase in bulk till they reach the lower grounds. It would seem, therefore, that during their passage through the air, they attract the congealed vapour, which increases them in size. But here we are at a loss how they come to be solid hard bodies, and not always soft, and composed of many small stars like snow. The flakes of snow, no doubt, increase in size as they descend, as well as the drops of rain or hailstones; but why should the one be in soft crystals, and the other in large hard lumps, seeing both are produced from congealed vapour? Some modern philosophers ascribe the formation of hail to electricity. Signor Beccaria supposes hail to be formed in the higher regions of the air, where the cold is intense, and where the electric matter is very copious. In these circumstances,

a great number of particles of water are brought near together, where they are frozen, and in their descent collect other particles, so that the density of the substance of the hailstone grows less and less from the centre; this being formed first in the higher regions, and the surface being collected in the lower. Agreeably to this, it is observed, that, in mountains, hailstones, as well as drops of rain, are very small, there being but little space through which they can fall and increase their bulk. Drops of rain and hail also agree in this, that the more intense the electricity that forms them, the larger they are. Motion is known to promote freezing, and so the rapid motion of the electrified clouds may produce that effect. A more intense electricity also, he thinks, unites the particles of hail more closely than the more moderate electricity does those of snow. In like manner we see thunder-clouds more dense than those that merely bring rain; and the drops of rain are larger in proportion, though they fall not from so great a height.

HAILING, the salutation or accosting of a ship at a distance, either at sea or in a harbour. The usual expression is, "Hoe, the ship ahoy!" To which she answers, "Holloa! Whence came ye? Where are ye bound? Good voyage! What cheer? All well! How fare ye?" &c.

HAILLAN (Bernard de Girard, lord of), a celebrated French historian. After having made some figure in the literary world, and as a translator, he applied himself to history with such success, that in 1571 Charles IX. made him historiographer of France. His history of France extends from Pharamond to the death of Charles VII. and is the first complete history of that kingdom composed in the French tongue. He was honoured by Henry III. with several marks of favour; and proposed to continue his history to the reign of Henry IV. but did not perform his promise. He died at Paris in 1610.

HAIMSUCKEN. See **HAMESECKEN**.

HAINAN, a considerable island of Asia, belonging to China, to the N. of the gulf of Cochinchina, and to the S. of the province of Canton, from which it is 12 miles distant. It is 400 miles in circumference. The soil of the N. part is level; but in the S. and E. are mountains, among which are valleys that produce two crops of rice every year. The inhabitants are mostly a wild sort of people, and great cowards, for 50 Chinese will put a thousand of them to flight. In general, they are a short and deformed people, and the colour of their skins is red dish. They are clothed from the waist downward only, and paint their faces like other savages. There are mines of gold and lapis lazuli, which last is carried to Canton, to paint the porcelain with. It produces the same fruits as China, beside sugar, tobacco, cotton, and indigo. Among the animals is a great black ape, with features resembling those of the human face; but they are very scarce. The common sort of apes are grey, and very ugly. Some of the inhabitants of the sea-coast have submitted to the Chinese.

HAINAULT, a province of the Netherlands; bounded on the N. by Brabant, on the N. W. by Flanders, on the W. by Artois, on the S. by Cambresis, Picardy, and Champagne, and on the E. by the territory of Liege, and the county of Namur. It is divided into Austrian Hainault, of which the capital is Mons; and French Hainault, which is included in the department of the North.

HAINAULT, a forest of Essex, lying to the S. E. of Epping Forest, and supposed to be so called from some of the deer, with which it was stocked, having been brought from the province of the same name in the Netherlands. In this forest is a celebrated oak, known through many centuries by the name of Fairlop. Beneath its shade, which overspreads an area of 300 feet in circuit, an annual fair has been long held on the 22d of July. A society of archers, called the Hainault Foresters, and consisting of some of the principal gentlemen and ladies of the county,

march round this tree, at certain stated times, dressed in elegant uniforms, and attended by a band of music.

HAIR, small filaments issuing out of the pores of the skins of animals; and serving most of them as a tegument or covering. In lieu of hair, the nakedness of some animals is covered with feathers, wool, scales, &c. Hair is found on all parts of the human body, except the soles of the feet and the palms of the hands. But it grows longest on the head, chin, breast, in the arm-pits, and about the privities.

The ancients held the hair a sort of excrement, fed only with excrementitious matters, and no proper part of a living body. They supposed it generated of the fuliginous parts of the blood, exhaled by the heat of the body to the surface, and there condensed in passing through the pores. Their chief reasons were, that the hair being cut, will grow again apace, even in extreme old age, and when life is very low: that in hectic and consumptive people, where the rest of the body is continually emaciating and attenuating, the hair shall thrive: nay, and that it will grow again in dead carcases. They added, that hair does not feed and grow like the other parts, by intussusception, i. e. by a juice circulating within it; but, like the nails, by juxtaposition, each part next the root thrusting forward that immediately before it.

But the moderns are agreed, that every hair does properly and truly live, and receive nutriment to fill and distend it like the other parts: which they argue hence, that the roots do not turn grey in aged persons sooner than the extremities, but the whole changes colour at once, and the like is observed in boys, &c.; which shows that there is a direct communication, and that all the parts are affected alike.

It may be observed, however, that, properly speaking, the life and growth of hairs is of a different kind from that of the rest of the body; and is not immediately derived therefrom, or reciprocated therewith. It is rather of the nature of vegetation. They grow as plants do out of the earth; or as some plants shoot from the parts of others; from which though they draw their nourishment, yet each has, as it were, its several life and a distinct economy. They derive their food from some juices in the body, but not from the nutritious juices of the body; whence they may live, even though the body be starved. Wulferus, in the *Philosophical Collections*, gives an account of a woman buried at Norimberg, whose grave being opened 43 years after her death, there was hair found issuing forth plentifully through the clefts of the coffin; insomuch, that there was reason to imagine the coffin had some time been covered all over with hair. The cover being removed, the whole corpse appeared in its perfect shape; but, from the crown of the head to the sole of the foot, covered over with a thick-set hair, long and curled. The sexton going to handle the upper part of the head with his fingers, the whole structure fell at once, leaving nothing in his hand but an handful of hair: there was neither skull nor any other bone left; yet the hair was solid and strong enough. Mr. Arnold, in the same collection, gives a relation of a man hanged for theft, who, in a little time, while he yet hung upon the gallows, had his body strangely covered over with hair. Some moderns, however, deny the authenticity of these and other similar relations.

The hairs ordinarily appear round or cylindrical; but the microscope also discovers triangular and square ones; which diversity of figure arises from that of the pores, to which the hairs always accommodate themselves. Their length depends on the quantity of the fluids which feed them, and their colour on some property in that humour; whence it is that at different stages of life, the colour usually changes. Their extremities split into two or three branches, especially when kept dry, or suffered to grow too long; so that what appears only a single hair to the naked eye, seems a brush to the microscope.

The hair of a mouse, viewed by Mr. Derham with a microscope, seemed to be one single transparent tube, with a pith made up of fibrous substances, running in dark lines, in some hairs transversely, in others spirally. The darker medullary parts or lines, he observes, were no other than small fibres convolved round, and lying closer together than in the other parts of the hair. They run from the bottom to the top of the hair; and, he imagines, may serve to make a gentle evacuation of some humour out of the body. Hence the hair of hairy animals, this author suggests, may not only serve as a fence against cold, &c. but as an organ of insensible perspiration.

Though the external surface of the body is the natural place for hairs, we have many well-attested instances of their being found also on the internal surface. Amatus Lusitanus mentions a person who had hair upon his tongue. Pliny and Valerius Maximus concur in their testimonies, that the heart of Aristomenes the Messenian was hairy. Cælius Rhodiginus relates the same of Hermogenes the rhetorician; and Plutarch, of Leonidas the Spartan. Hairs are said to have been frequently found in the breasts of women, and to have occasioned the distemper called *trichiasis*; but some authors are of opinion, that these are small worms, and not hairs. There have been, however, various and indisputable observations of hairs found in the kidneys, and voided by urine.

Hippocrates is of opinion, that the glandular parts are the most subject to hair; but bundles of hair have been found in the muscular parts of beef, and in such parts of the human body as are equally firm with that. Hair has been often found in abscesses and imposthumations. Schultetus, opening the abdomen of a woman, found 12 pints of water, and a large lock or bundle of hair swimming loose in it. But of all the internal parts, there is none so much subject to an unnatural growth of hair as the ovaries of females, and that as well of the human species as of other animals. Of this Dr. Tyson relates three remarkable instances: two of these were young women, and the other was a bitch. The animal had been much emaciated in its hinder parts; the hair was about an inch and a half long; but the most remarkable particular was, that hair was also found lying loose in the cavities of the veins. We have several instances of mankind being affected in the same manner. Cardan relates, that he found hair in the blood of a Spaniard: and Slonatus in that of a gentlewoman of Cracovia; and Schultetus declares from his own observation, that those who are afflicted with the *plica polonica* have very often hair in their blood: but these accounts are incredible.

Diseases of the Hair. Almost the only disease of the hair, besides the remarkable one called *plica polonica*, is its falling off, or *baldriness*. For this many remedies have been recommended, but scarce any of them can be depended upon. The juice of burdock, and the lixivial salts of vine ashes, are said to be efficacious; also the powder of hermodactyls, and the decoction of boxwood. A remarkable instance of the efficacy of this last is given in the *Encycl. Brit.* under the article *Buxus*. Some authors give instances of the hair changing its colour in a short time, through grief, or by reason of a fright, &c.

Hair as an Ornament, or as an Ensign of Dignity or of Religion. By the Jews hair was worn naturally long, just as it grew; but the priests had theirs cut every fortnight, while they were in waiting at the temple; they made use of no razors, however, but scissars only. The Nazarites, while their vow continued, were forbidden to touch their heads with a razor. See NAZARITE.

The falling of the hair, or a change of its colour, was regarded amongst the Hebrews as a sign of the leprosy. Black hair was esteemed by them as the most beautiful. Absalom's hair was cut once a-year, and is said to have weighed 200 shekels, by the king's weight, which is about 31 ounces. The

law of God hath left no particular ordinances with respect to the hair.

The hair of both Jewish and Grecian women engaged a principal share of their attention, and the Roman ladies seem to have been no less curious with respect to theirs. They generally wore it long, and dressed it in a variety of ways, ornamenting it with gold, silver, pearls, &c. On the contrary, the men amongst the Greeks and Romans, and amongst the later Jews, wore their hair short, as may be collected from books, medals, statues, &c. This formed a principal distinction in dress betwixt the sexes. This observation illustrates a passage in 1 Cor. xi. 14, 15. St. Paul forbids the Corinthian women, when praying by divine inspiration, to have their hair dishevelled; probably because this made them resemble the heathen priestesses, when actuated by the pretended influence of their gods.

Amongst the Greeks, both sexes, a few days before marriage, cut off and consecrated their hair as an offering to their favourite deities. It was also customary among them to hang the hair of the dead on the doors of their houses previous to interment. They likewise tore, cut off, and sometimes shaved their hair, when mourning for their deceased relations or friends, which they laid upon the corpse or threw into the pile, to be consumed together with the body. The ancients imagined that no person could die till a lock of hair was cut off; and this act they supposed was performed by the invisible hand of death, or Iris, or some other messenger of the gods. This hair, thus cut off, they fancied consecrated the person to the infernal deities, under whose jurisdiction the dead were supposed to be. It was a sort of first fruits which sanctified the whole. See *Virg. Æn.* 4. 694.

Whatever was the fashion, with respect to the hair, in the Grecian states, slaves were forbidden to imitate the freemen. The hair of the slaves was always cut in a particular manner, called *θηξ ἀνδραποδωνος*, which they no longer retained after they procured their freedom.

It was esteemed a notable honour among the ancient Gauls to have long hair, and hence came the appellation *Gallia comata*. For this reason Julius Cæsar, upon subduing the Gauls, made them cut off their hair as a token of submission. It was with a view to this, that such as afterwards quitted the world to go and live in cloisters, procured their hair to be shaven off; to show that they bid adieu to all earthly ornaments, and made a vow of perpetual subjection to their superiors.

Gregory of Tours assures us, that in the royal family of France, it was a long time the peculiar mark and privilege of kings and princes of the blood to wear long hair, artfully dressed and curled; every body else was obliged to be polled, or cut round, in sign of inferiority and obedience. Some writers assure us, that there were different cuts for all the different qualities and conditions; from the prince who wore it at full length, to the slave or villain who was quite cropt. To cut off the hair of a son of France, under the first race of kings, was to declare him excluded from the right of succeeding to the crown, and reduced to the condition of a subject.

In the eighth century, it was the custom of people of quality to have their children's hair cut the first time by persons they had a particular honour and esteem for; who, in virtue of this ceremony, were reputed a sort of spiritual parents or godfathers thereof. Though this practice appears to have been more ancient; inasmuch as we read, that Constantine sent the pope the hair of his son Heraclius, as a token that he desired him to be his adoptive father.

The parade of long hair became still more and more obnoxious in the progress of Christianity, as something utterly inconsistent with the profession of persons who bore the cross. Hence numerous injunctions and canons to the contrary. Pope Anicetus is commonly supposed to have been the first who forbade

the clergy to wear long hair: but the prohibition is of an older standing in the churches of the east; and the letter wherein that decree is written, is of a much later date than that pope. The clerical tonsure is related by Isidore Hispalensis, as of apostolical institution.

Long hair was anciently held so odious, that there is a canon still extant of the year 1096, importing, that such as wore long hair should be excluded coming into church while living, and not be prayed for when dead. We have a furious declamation of Luitprand against the emperor Phocas, for wearing long hair, after the manner of the other emperors of the east, all except Theophilus, who, being bald, enjoined all his subjects to shave their heads.

The French historians and antiquaries have been very exact in recording particulars of the hair of their several kings. Charlemagne wore it very short, his son shorter; Charles the Bald had none at all. Under Hugh Capet it began to appear again: this the ecclesiastics took in dudgeon, and excommunicated all who let their hair grow. Peter Lombard expostulated the matter so warmly with Charles the Young, that he cut off his hair; and his successors for some generations wore it very short. A professor of Utrecht, in 1650, wrote expressly on the question, Whether it be lawful for men to wear long hair? and concluded for the negative. Another divine, named Reeves, who had written for the affirmative, replied to him.

The ancient Britons were extremely proud of the length and beauty of their hair, and were at much pains in dressing and adorning their heads. Some of them carried their fondness for and admiration of their hair to an extravagant height. It is said to have been the last and most earnest request of a young warrior, who was taken prisoner and condemned to be beheaded, that no slave might be permitted to touch his hair, which was remarkably long and beautiful, and that it might not be stained with his blood. We hardly ever meet with a description of a fine woman or beautiful man, in the poems of Ossian, but their hair is mentioned as one of their greatest beauties. Not contented with the natural colour of their hair, which was commonly fair or yellow, they made use of certain washes to render it still brighter. One of these washes was a composition of lime, the ashes of certain vegetables, and tallow. They made use of various arts also to make the hair of their heads grow thick and long; which last was not only esteemed a great beauty, but was considered as a mark of dignity and noble birth. Boadicia queen of the Iceni is described by Dio with very long hair, flowing over her shoulders, and reaching down below the middle of her back. The Britons shaved all their beards, except their upper lips; the hair of which they, as well as the Gauls, allowed to grow to a very inconvenient length.

In after-times, the Anglo-Saxons and Danes also considered fine hair as one of the greatest beauties and ornaments of their persons, and were at no little pains in dressing it to advantage. Young ladies before marriage wore their hair uncovered and untied, flowing in ringlets over their shoulders; but as soon as they were married, they cut it shorter, tied it up, and put on a head-dress of some kind or other according to the prevailing fashion. To have the hair entirely cut off was so great a disgrace, that it was one of the greatest punishments inflicted on those women who were guilty of adultery. The Danish soldiers who were quartered upon the English, in the reigns of Edgar the Peaceable and of Ethelred the Unready, were the beaux of those times, and were particularly attentive to the dressing of their hair; which they combed at least once every day, and thereby captivated the affections of the English ladies. The clergy, both secular and regular, were obliged to shave the crowns of their heads, and keep their hair short, which distinguished them from the laity; and several canons were made against their concealing their tonsure, or allowing their hair to grow

long. The shape of this clerical tonsure was the subject of long and violent debates between the English clergy on the one hand, and those of the Scots and Picts on the other; that of the former being circular, and that of the latter only semicircular. It appears very plainly, that long flowing hair was universally esteemed a great ornament; and the tonsure of the clergy was considered as an act of mortification and self-denial, to which many of them submitted with reluctance, and endeavoured to conceal as much as possible. Some of them who affected the reputation of superior sanctity inveighed with great bitterness against the long hair of the laity; and laboured earnestly to persuade them to cut it short, in imitation of the clergy. Thus the famous St. Wulfstan, bishop of Worcester, is said to have declaimed with great vehemence against luxury of all kinds, but chiefly against long hair as most criminal and most universal. "The English (says William of Malmesbury in his Life of St. Wulfstan) were very vicious in their manners, and plunged in luxury, through the long peace which they had enjoyed in the reign of Edward the Confessor. The holy prelate Wulfstan reproved the wicked of all ranks with great boldness; but he rebuked those with the greatest severity who were proud of their long hair. When any of those vain people bowed their heads before him to receive his blessing, before he gave it he cut a lock of their hair with a little sharp knife, which he carried about him for that purpose; and commanded them, by way of penance for their sins, to cut all the rest of their hair in the same manner. If any of them refused to comply with this command, he denounced the most dreadful judgments upon them, reproached them for their effeminacy, and foretold, that as they imitated women in the length of their hair, they would imitate them in their cowardice when their country was invaded; which was accomplished at the landing of the Normans."

This continued to be long a topic of declamation among the clergy, who even represented it as one of the greatest crimes, and most certain marks of reprobation. Anselm archbishop of Canterbury went so far as to pronounce the then terrible sentence of excommunication against all who wore long hair; for which pious zeal he is very much commended. Serlo, a Norman bishop, acquired great honour by a sermon which he preached before Henry I. A. D. 1104, against long and curled hair; with which the king and all his courtiers were so much affected, that they consented to resign their flowing ringlets, of which they had been so vain. The prudent prelate gave them no time to change their minds, but immediately pulled a pair of shears out of his sleeve, and performed the operation with his own hand. Another incident happened about 25 years after, which gave a temporary check to the prevailing fondness for long hair. It is thus related by a contemporary historian: "An event happened, A. D. 1129, which seemed very wonderful to our young gallants; who, forgetting that they were men, had transformed themselves into women by the length of their hair. A certain knight, who was very proud of his long luxuriant hair, dreamed that a person suffocated him with his curls. As soon as he awoke from his sleep, he cut his hair to a decent length. The report of this spread over all England, and almost all the knights reduced their hair to the proper standard. But this reformation was not of long continuance; for in less than a year all who wished to appear fashionable returned to their former wickedness, and contended with the ladies in length of hair. Those to whom nature had denied that ornament supplied the defect by art." The Greeks, and, after their example, the Romans, wore false hair.

Commerce of HAIR. Hair makes a very considerable article in commerce, especially since the mode of perukes has obtained. The hair of the growth of the northern countries, as England, &c. is valued much beyond that of the more southern ones, as Italy, Spain, the south parts of France, &c. The

merit of good hair consists in its being well fed, and neither too coarse nor too slender; the bigness rendering it less susceptible of the artificial curl, and disposing it rather to frizzle, and the smallness making its curl of too short duration. Its length should be about 25 inches; the more it falls short of this the less value it bears. There is no certain price for hair; but it is sold from five shillings to five pounds an ounce, according to its quality.

The scarceness of grey and white hair has put the dealers in that commodity upon the methods of reducing other colours to this. This is done by spreading the hair to bleach on the grass like linen, after first washing it out in a lixivious water. This lye, with the force of the sun and air, brings the hair to so perfect a whiteness, that the most experienced person may be deceived therein; there being scarce any way of detecting the artifice, but by boiling and drying it, which leaves the hair of the colour of a dead walnut-tree leaf. There is also a method of *dyeing hair* with bismuth, which renders such white hair as borders too much upon the yellow, of a bright silver colour: boiling is the proof of this too, the bismuth not being able to stand it.

Hair may be also changed from a red, grey, or other disagreeable colour, to a brown or deep black, by a solution of silver. The liquors sold under the name of *hair-waters*, are, in fact, no more than solutions of silver in aquafortis, largely diluted with water, with the addition perhaps of other ingredients, which contribute nothing to their efficacy. The solution should be fully saturated with the silver, that there may be no more acid in it than is necessary for holding the metal dissolved; and besides dilution with water, a little spirit of wine may be added for the further decomposition of the acid. It must be observed, that for diluting the solution, distilled water, or pure rain-water, must be used; the common spring-waters turning it milky, and precipitating a part of the dissolved silver. It is to be observed also, that if the liquor touches the skin, it has the same effect on it as on the matter to be stained, changing the part moistened with it to an indelible black.—Hair may also be dyed of any colour in the same manner as wool. See DYEING.

Hair which does not curl or buckle naturally, is brought to it by art, by first boiling and then baking it in the following manner: After having picked and sorted the hair, and disposed it in parcels according to lengths, they roll them up and tie them tight down upon little cylindrical instruments, either of wood or earthen ware, a quarter of an inch thick, and hollowed a little in the middle, called *pipes*; in which state they are put in a pot over the fire, there to boil for about two hours. When taken out, they let them dry; and when dried, they spread them on a sheet of brown paper, cover them with another, and thus send them to the pastry-cook; who making a crust or coffin around them of common paste, sets them in an oven till the crust is about three-fourths baked.

The end by which a hair grew to the head is called the *bead of the hair*; and the other, with which they begin to give the buckle, the *joint*. Formerly the peruke-makers made no difference between the ends, but curled and wove them by either indifferently: but this made them unable to give a fine buckle; hair woven by the point never taking a right curl. Foreigners own themselves obliged to the English for this discovery, which was first carried abroad by a peruke-maker of our country.

Hair is also used in various other arts and manufactures. In particular, the hair of beavers, hares, rabbits, &c. is the principal matter whereof hats are made. Spread on the ground, and left to putrefy on corn-lands, hair, like all other animal substances, *viz.* horns, hoofs, blood, garbage, &c. proves good manure.

HAIR, in farriery, is generally called the *coat*; and, with re-

gard to horses, deserves some consideration. The hair growing on the fetlock serves as a defence to the prominent part of it in travelling in stony ways or in frosty weather. If the hair of a horse's neck, and the parts most uncovered, be close, smooth, and sleek, it is an indication of his being in health and good case. In order to make the hide of an horse soft and sleek, he must be kept in warm clothing. Some, in order to effect this, bleed him and rub him all over with his own blood, and, after repeating it two or three days, curry and dress him well, which makes his coat shine as if it were covered with a fine varnish. If hair fall off from the mane or tail, it is caused either by his having a dry mange, or from some furfeit or cold. To cure the mange, anoint the horse's mane and crest with black soap; or with a strong lye of ashes, and wash the part all over with it. But if a canker should grow on a horse's tail, then the part should be dressed with verdegriis, or blue vitriol, and treated as an ill-conditioned wound. See FARRIERY.

If you would take away hair from any part of a horse's body, it may be done by applying the caustic called *Kalipurum*, which should be slightly rubbed over the surface so as just to destroy the skin; but care should be taken not to employ it too profusely, as it will in that case act more deeply than is required.

HAIR, or *Down*, of Plants; a general term expressive of all the hairy and glandular appearances on the surface of plants, to which they are supposed by naturalists to serve the double purpose of defensive weapons and vessels of secretion. These hairs are minute threads of greater or less length and solidity; some of them visible to the naked eye; whilst others are rendered visible only by the help of glasses. Examined by a microscope, almost all the parts of plants, particularly the young stalks or stems, appear covered with hairs. Hairs on the surface of plants present themselves under various forms: in the leguminous plants, they are generally cylindric; in the mallow tribe, terminated in a point; in agrimony, shaped like a fish-hook; in nettle, awl-shaped and jointed; and in some compound flowers with hollow or funnel-shaped florets, they are terminated in two crooked points. Probable as some experiments have rendered it, that the hairs on the surface of plants contribute to some organical secretion, their principal use seems to be to preserve the parts in which they are lodged from the bad effects of violent frictions, from winds, from extremes of heat and cold, and such like external injuries. M. Guettard, who has established a botanical method from the form, situation, and other circumstances of the hairy and glandular appearances on the surface of plants, has demonstrated, that these appearances are generally constant and uniform in all the plants of the same genus. The same uniformity seems to characterise all the different genera of the same natural order. The different sorts of hairs which form the down upon the surface of plants were imperfectly distinguished by Grew in 1682, and by Malpighi in 1686. M. Guettard just mentioned was the first who examined the subject both as a botanist and a philosopher. His observations were published in 1747.

HAIR-Cloths, in military affairs, are large pieces of cloth made with horse hair. They are used for covering the powder in waggons, or upon batteries; as also for covering charged bombs or hand grenades, and many other uses in magazines.

HAIR-Powder. See STARCH.

HAIR-Worm. See GORDIUS.

HAKE, in ichthyology, the English name of a fish common in the English and some other seas, and called by authors the *merlucius* and *lucius marinus*. This fish was used of old dried and salted. Hence the proverb obtains in Kent, *As dry as a bake*.

HAKLUYT (Richard), a naval historian, is supposed to have been born in London about the year 1553, and descended of a

genteel family in Herefordshire, as the name frequently occurs in the list of high-sheriffs for that county in former reigns. He was educated at Westminster-school; and thence, in 1570, removed to Christ-church, Oxford; where he applied himself particularly to the study of cosmography, and read public lectures in that science. Sir Edward Stafford being sent ambassador to France in 1583, Mr. Hakluyt was one of his attendants, probably in the capacity of chaplain. He was at this time master of arts and professor of divinity. In 1585 he obtained the royal mandate for the next vacant prebend of Bristol, to which preferment he succeeded during his residence at Paris. Constantly attentive to his favourite cosmographical inquiries, in searching the French libraries, he found a valuable history of Florida, which had been discovered about 20 years before by Captain Loudonniere and others: this he caused to be published, at his own expence, in the French language, and soon after revised and republished Peter Martyr's book *De orbe novo*. After five years residence in France, Mr. Hakluyt returned to England in company with lady Sheffield, sister to the lord admiral Howard. In the year 1589 he published his *Collection of Voyages* in one folio volume, which in 1598 was republished in three. In 1605 our author was made prebendary of Westminster; which, with the rectory of Wetheringsfet in the county of Suffolk, seems to have been the summit of his preferment. He died in 1616, and was buried in Westminster-abbey; bequeathing to his son Edmund his manor of Bridge-Place, and several houses in Tothil-street, Westminster. He was an indefatigable and faithful historian. His works are, 1. A *Collection of Voyages and Discoveries*, a small volume. 2. *History of Florida*, above mentioned. 3. *The principal Navigations, Voyages, and Discoveries of the English Nation, made by Sea or over Land to the farthest distant Quarters of the Earth, at any Time within the Compass of these 1500 Years*, in three vols. folio. 4. *The Discoveries of the World, from the first Original to the Year 1555*, written in the Portugal Tongue by Ant. Galvano; corrected, much amended, and translated into English, by Richard Hakluyt. 5. *Virginia richly valued*, by the Description of the Main Land of Florida, her next Neighbour, &c. written by a Portugal Gentleman of Elvas, and translated by Richard Hakluyt. Besides these, he left several manuscripts, which were printed in Purchas's collection.

HALBERSTADT, a handsome town of Germany, in the circle of Lower Saxony, and capital of a principality of the same name. It was formerly capital of the bishopric of Halberstadt, now secularized. The cathedral is a superb structure, with a fine peal of bells; and there are two regular abbeys within the town, and one without. There are also two nunneries. The Jews are tolerated here, and carry on a great trade; and the inhabitants brew excellent beer. It is subject to the king of Prussia, and is seated on the river Hothem, 32 miles S. E. of Brunswick. Lon. 11. 24. E. Lat. 52. 6. N.

HALBERT, or **HALBARD**, in the art of war, a well-known weapon carried by the sergeants of marching regiments. It is a sort of spear, the shaft of which is about five feet long, and made of ash or other wood. Its head is armed with a steel point, not unlike the point of a two edged sword. But, besides this sharp point which is in a line with the shaft, there is a cross piece of steel, flat and pointed at both ends; but generally with a cutting edge at one extremity, and a bent sharp point at the other; so that it serves equally to cut down or to push withal. It is also useful in determining the ground between the ranks, and adjusting the files of a battalion. The word is formed of the German *hal*, "hall," and *bard*, "an hatchet." Vollius derives it from the German *balleteert*, of *bel*, "clarus, splendens," and *bart*, "ax." The *halbert* was anciently a common weapon in the army, where there were companies of halberdiers. It is said to have been used by the

Amazons, and afterwards by the Rhaetians and Vindelicians about the year 570. It was called the *Danish ax*, because the Danes bore an halbert on the left shoulder. From the Danes it was derived to the Scots, from the Scots to the English Saxons, and from them to the French.

HALCYON, in ornithology, a name given by the ancients to the alcedo or king's fisher. See *ALCEDO*.

HALCYON *Days*, in antiquity, a name given to seven days before and as many after the winter solstice; by reason the halcyon, invited by the calmness of the weather, laid its eggs in nets built in the rocks, close by the brink of the sea, at this season.

HALDE (John Baptist du), a learned French Jesuit, born at Paris in 1674. He was extremely well versed in Asiatic geography; and we have of his compilation a work intitled *Grand description de la Chine & de la Tartarie*, from original memoirs of the Jesuitical missionaries, in 4 vols. folio. He was also concerned in a collection of letters begun by father Gobien, called *Des lettres edifiantes*, in 18 vols; and published some Latin poems and orations. He died in 1743.

HALDENSTEIN, a free and independent barony of the country of the Grisons. It consists of a small semicircular plain, which lies between the Rhine and the foot of Mount Calendar, about five miles in length, and scarcely one in breadth. It occupies also part of the mountain, which is so steep as not to be inhabited. It contains only two villages, Haldenstein and Sewils; and the whole number of the baron's subjects does not exceed 400. The ancient castle is now in ruins; but the baron resides in a house built in 1545, which commands a fine view of the town of Coire and the adjacent country.

HALE, in the sea language, signifies *pull*; as, to hale up, is to pull up; to hale in or out, is to pull in or out. To over-hale a rope, is to hale it too stiff, or to hale it the contrary way.

Keel-HALE. See *DUCKING*.

HALE (Sir Matthew), lord chief justice of the king's-bench in the reign of Charles II. was the son of Robert Hale, Esq. a barrister of Lincoln's Inn, and was born in 1609. He was educated at Oxford, where he made a considerable progress in learning; but was afterwards diverted from his studies by the levities of youth. From these he was reformed by Mr. John Alanvill serjeant at law; and applying to the study of the law, entered into Lincoln's Inn. Noy the attorney-general took early notice of him, and directed him in his studies. Mr. Selden also took much notice of him; and it was this acquaintance that first set Mr. Hale on a more enlarged pursuit of learning, which he had before confined to his own profession. During the civil wars, he behaved so well as to gain the esteem of both parties. He was employed in his practice by all the king's party; and was appointed by the parliament one of the commissioners to treat with the king. The execution of king Charles gave him very sensible regret. However, he took the engagement; and was appointed, with several others, to consider of the reformation of the law. In 1653 he was by writ made serjeant at law, and soon after appointed one of the justices of the common pleas. Upon the death of Oliver Cromwell he refused to accept of the new commission offered him by Richard his successor. He was returned one of the knights of Gloucestershire, in the parliament which called home Charles II. Soon after he was made lord chief baron of the exchequer; but declined the honour of knighthood, till lord chancellor Hyde, sending for him upon business when the king was at his house, told his majesty, that "there was his modest chief baron;" upon which he was unexpectedly knighted. He was one of the principal judges that sat in Clifford's Inn about settling the difference between landlord and tenant, after the fire of London, in which he behaved to the satisfaction of all parties concerned,

and also in his post of chief baron acted with inflexible integrity. One of the first peers went once to his chamber and told him, "That having a suit in law to be tried before him, he was then to acquaint him with it, that he might the better understand it when it should come to be tried in court." Upon which the lord chief baron interrupted him, and said, "He did not deal fairly to come to his chambers about such affairs; for he never received information of such causes but in open court, where both parties were to be heard alike." Upon which his grace (for it was a duke) went away not a little dissatisfied, and complained of it to the king as a rudeness that was not to be endured: but his majesty bid him content himself that he was used no worse; and said, "That he verily believed he would have used him no better if he had gone to solicit him in any of his own causes." Another remarkable incident happened in one of his circuits. A gentleman who had a trial at the assizes had sent him a buck for his table. When judge Hale therefore heard his name, he asked "if he was not the same person who had sent him the venison?" and finding that he was the same, told him, that "he could not suffer the trial to go on till he had paid him for his buck." The gentleman answered, that "he never sold his venison; and that he had done nothing to him which he did not do to every judge who had gone that circuit:" which was confirmed by several gentlemen present. The lord chief baron, however, would not suffer the trial to proceed till he had paid for the present: upon which the gentleman withdrew the record. In short, he was in 1671 advanced to be lord chief justice of the king's bench; but about four years after this promotion, his health declining, he resigned his post in February 1675-6, and died in December following. This excellent man, who was an ornament to the bench, to his country, and to human nature, wrote, 1. An Essay on the Gravitation and Non-gravitation of Fluid Bodies. 2. Observations touching the Torricellian Experiment. 3. Contemplations, moral and divine. 4. The Life of Pomponius Atticus, with political and moral Reflections. 5. Observations on the Principles of natural Motion. 6. The primitive Origination of Mankind. He also left a great number of manuscripts, in Latin and English, upon various subjects; among which are, his Pleas of the Crown, since published by Mr. Emlin in two volumes folio; and his Original Institution, Power, and Jurisdiction of Parliaments.

HALEN, a town of Austrian Brabant, on the river Geet, 24 miles W. of Maestricht. Lon. 5. 4. E. Lat. 50. 58. N.

HALES (Stephen), D. D. a celebrated divine and philosopher, was born in 1677. He was the sixth son of Thomas Hales, Esq. the eldest son of Sir Robert Hales, created a baronet by king Charles II. and Mary the heiress of Richard Langley of Abbot's-Wood in Hertfordshire. In 1696 he was entered a pensioner at Bennet-college, Cambridge; and was admitted a fellow in 1703, and became bachelor of divinity in 1711. He soon discovered a genius for natural philosophy. Botany was his first study; and he used frequently to make excursions among Gogmagog hills, in company with Dr. Stukely, with a view of prosecuting that study. In these expeditions he likewise collected fossils and insects, having contrived a curious instrument for catching such of the latter as have wings. In company with this friend he also applied himself to the study of anatomy, and invented a curious method of obtaining a representation of the lungs in lead. They next applied themselves to the study of chemistry; in which, however, they did not make any remarkable discoveries. In the study of astronomy Mr. Hales was equally assiduous. Having made himself acquainted with the Newtonian system, he contrived a machine for showing the phenomena on much the same principles with that afterwards made by Mr. Rowley, and, from the name of his patron, called an *Orrery*.

About the year 1710 he was presented to the perpetual cure of Teddington near Twickenham, in Middlesex; and afterwards accepted of the living of Porlock in Somersetshire, which vacated his fellowship in the college, and which he exchanged for the living of Faringdon in Hampshire. Soon after, he married Mary, the daughter and heiress of Dr. Newce, who was rector of Halitham in Sussex, but resided at Much-Haddam in Hertfordshire. On the 13th of March 1718, he was elected member of the Royal Society; and on the 5th of March, in the year following, he exhibited an account of some experiments he had lately made on the effect of the sun's warmth in raising the sap in trees. This procured him the thanks of the society, who also requested him to prosecute the subject. With this request he complied with great pleasure; and on the 14th of June 1725 exhibited a treatise in which he gave an account of his progress. This treatise being highly applauded by the society, he farther enlarged and improved it; and in April 1727 he published it under the title of *Vegetable Statics*. This work he dedicated to his late majesty king George II. who was then prince of Wales; and he was the same year chosen one of the council of the Royal Society, Sir Hans Sloane being at the same annual election chosen their president. The book being well received, a second edition of it was published in 1731. In a preface to this edition Mr. Hales promised a sequel to the work, which he published in 1733 under the title of *Statical Essays*, &c. In 1732 he was appointed one of the trustees for establishing a new colony in Georgia. On the 5th of July 1733 the university of Oxford honoured him with a diploma for the degree of doctor in divinity; a mark of distinction the more honourable, as it is not usual for one university to confer academical honours on those who were educated at another. In 1734, when the health and morals of the lower and middling class of people were subverted by the excessive drinking of gin, he published, though without his name, A friendly Admonition to the Drinkers of Brandy and other spirituous Liquors; which was twice reprinted. The latter end of the same year he published a sermon which he preached at St. Bride's before the rest of the trustees for establishing a new colony in Georgia. His text was, "Bear ye one another's burthens, and so fulfil the law of Christ;" Galatians vi. 2. In 1739 he printed a volume in 8vo, intitled, *Philosophical Experiments on Sea-water, Corn, Flesh, and other Substances*. This work, which contained many useful instructions for voyagers, was dedicated to the lords of the admiralty. The same year he exhibited to the Royal Society an account of some farther experiments towards the discovery of medicines for dissolving the stone in the kidneys and bladder, and preserving meat in long voyages, for which he received the gold medal of Sir Godfrey Copley's donation. The year following he published some account of Experiments and Observations on Mrs. Stephens's Medicines for dissolving the Stone, in which their dissolvent power is inquired into and demonstrated.

In 1741 he read before the Royal Society an account of an instrument which he invented, and called a *ventilator*, for conveying fresh air into mines, hospitals, prisons, and the close parts of ships: he had communicated it to his particular friends some months before; and it is very remarkable, that a machine of the same kind, for the same purpose, was in the spring of the same year invented by one Martin Triewald, an officer in the service of the king of Sweden, called *captain of mechanics*, for which the king and senate granted him a privilege in October following, and ordered every ship of war in the service of that state to be furnished with one of them; a model also of this machine was sent into France, and all the ships in the French navy were also ordered to have a ventilator of the same sort. It happened also, that about the same time one Sutton, who kept a coffee house in Aldersgate-street, invented a ventila-

tor of another construction to draw off the foul air out of ships by means of the cook-room fire: but poor Sutton had not interest enough to make mankind accept the benefit he offered them; though its superiority to Dr. Hales's contrivance was evident, and among others Dr. Mead and the late ingenious Mr. Benjamin Robins gave their testimony in its favour. See *Air-Pipes*. The public, however, is not less indebted to the ingenuity and benevolence of Dr. Hales, whose ventilators came more early into use for many purposes of the greatest importance to life, particularly for keeping corn sweet, by blowing through it fresh showers of air; a practice very soon adopted by France, a large granary having been made, under the direction of Duhamel, for the preservation of corn in this manner, with a view to make it a general practice.

In 1743, Dr. Hales read before the Royal Society a description of a method of conveying liquors into the *abdomen* during the operation of tapping, and it was afterwards printed in their Transactions. In 1745, he published some experiments and observations on tar-water, which he had been induced to make by the publication of a work called *Siris*, in which the late learned and most excellent Dr. Berkley, bishop of Cloyne, had recommended tar-water as an universal medicine: on this occasion several letters passed between them on the subject, particularly with respect to the use of tar-water in the disease of the horned cattle. In the same year he communicated to the public, by a letter to the editor of the Gentleman's Magazine, a description of a *back-beaver*, which will winnow and clean corn much sooner and better than can be done by the common method. He also, at the same time, and by the same channel, communicated to the public a cheap and easy way to preserve corn sweet in sacks; an invention of great benefit to farmers, especially to poor leasers, who want to keep small quantities of corn for some time, but have no proper granary or repository for that purpose. He also the same year took the same method to publish directions how to keep corn sweet in heaps without turning it, and to sweeten it when musty. He published a long paper, containing an account of several methods to preserve corn by ventilators; with a particular description of several sorts of ventilators, illustrated by a cut, so that the whole mechanism of them may be easily known, and the machine constructed by a common carpenter. He published also in the same volume, but without his name, a detection of the fallacious boasts concerning the efficacy of the liquid shell in dissolving the stone in the bladder. In 1746 he communicated to the Royal Society a proposal for bringing small passable stones soon, and with ease, out of the bladder: and this was also printed in their Transactions. In the Gentleman's Magazine for July 1747, he published an account of a very considerable improvement of his back-beaver, by which it became capable of clearing corn of the very small grain, seeds, blacks, smut-balls, &c. to such perfection as to make it fit for seed-corn. In 1748 he communicated to the Royal Society a proposal for checking, in some degree, the progress of fires, occasioned by the great fire which happened that year in Cornhill: and the substance of this proposal was printed in their Transactions. In the same year he also communicated to the Society two memoirs, which are printed in their Transactions; one on the great benefit of ventilators, and the other on some experiments in electricity. In 1749 his ventilators were fixed in the Savoy prison, by order of the right hon. Henry Fox, Esq; then secretary at war, afterwards lord Holland; and the benefit was so great, that though 50 or 100 in a year often died of the gaol-distemper before, yet from the year 1749 to the year 1752 inclusive, no more than four persons died, though in the year 1750 the number of prisoners was 240; and of those four, one died of the small-pox, and another of intemperance. In the year 1750 he published some considerations on the causes of earthquakes; occasioned by the

flight shocks felt that year in London. The substance of this work was also printed in the Philosophical Transactions. The same year he exhibited an examination of the strength of several purging waters, especially of the water of *Jessop's well*, which is printed in the Philosophical Transactions.

Dr. Hales had now been several years honoured with the esteem and friendship of his royal highness Frederick prince of Wales; who frequently visited him at Teddington, from his neighbouring palace at Kew, and took a pleasure in surprising him in the midst of those curious researches into the various parts of nature which almost incessantly employed him. Upon the prince's death, which happened this year, and the settlement of the household of the princess-dowager, he was, without his solicitation, or even knowledge, appointed clerk of the closet, or almoner, to her royal highness. In 1751 he was chosen by the college of physicians to preach the annual sermon called *Crowne's lecture*: Dr. William Crowne having left a legacy for a sermon to be annually preached on "the wisdom and goodness of God displayed in the formation of man." Dr. Hales's text was, *With the ancient is wisdom, and in length of days understanding*, Job xii. 12. This sermon, as usual, was published at the request of the college. In the latter end of the year 1752, his ventilators, worked by a windmill, were fixed in Newgate, with branching trunks to 24 wards; and it appeared that the disproportion of those that died in the gaol before and after this establishment was as 16 to 7. He published also a farther account of their success, and some observations on the great danger arising from foul air, exemplified by a narrative of several persons seized with the gaol-fever by working in Newgate.

On the death of Sir Hans Sloane, which happened in the year 1753, Dr. Hales was elected a member of the Academy of Sciences at Paris in his room. The same year he published in the Gentleman's Magazine some farther considerations about means to draw the foul air out of the sick rooms of occasional army-hospitals, and private houses in town. He also published many other curious particulars relative to the use and success of ventilators. The same year a description of a sea-gage, which the doctor invented to measure unsathomable depths, was communicated to the public in the same miscellany: this paper was drawn up about the year 1732 or 1733, by the doctor, for the late Colin Campbell, Esq. who employed the ingenious Mr. Hawksbee to make the machine it describes, which was tried in various depths, and answered with great exactness, yet was at last lost near Bermuda. In 1754, he communicated to the Royal Society some experiments for keeping water and fish sweet with lime-water, an account of which was published in the Philosophical Transactions. He also continued to enrich their memoirs with many useful articles from this time till his death, particularly a method of forwarding the distillation of fresh from salt water by blowing showers of fresh air up through the latter during the operation. In 1757 he communicated to the editor of the Gentleman's Magazine an easy method of purifying the air, and regulating its heat in melon-frames and green-houses; also further improvements in his method of distilling sea-water.

His reputation and the interest of his family and friends might easily have procured him farther preferment: but of farther preferment he was not desirous; for, being nominated by his late Majesty to a canonry of Windsor, he engaged the princess to request his majesty to recall his nomination. That a man so devoted to philosophical studies and employments, and so conscientious in the discharge of his duty, should not desire any preferment which would reduce him to the dilemma either of neglecting his duty, or foregoing his amusement, is not strange: but that he would refuse an honourable and profitable appointment, for which no duty was to be done that would interrupt his habits of life, can scarce be imputed to his

temperance and humility without impeaching his benevolence; for, if he had no wish of any thing more for himself, a liberal mind would surely have been highly gratified by the distribution of so considerable a sum as a canonry of Windsor would have put into his power, in the reward of industry, the alleviation of distress, and the support of helpless indigence. He was, however, remarkable for social virtue and sweetness of temper; his life was not only blameless, but exemplary in a high degree; he was happy in himself, and beneficial to others, as appears by this account of his attainments and pursuits; the constant serenity and cheerfulness of his mind, and the temperance and regularity of his life, concurred, with a good constitution, to preserve him in health and vigour to the uncommon age of fourscore and four years. He died at Teddington in 1761; and was buried, pursuant to his own directions, under the tower of the parish-church, which he built at his own expence not long before his death.—Her royal highness the princess of Wales erected a monument to his memory in Westminster abbey.

HALESIA, in botany; a genus of the monogynia order, belonging to the dodecandria class of plants; and in the natural method ranking under the 18th order, *Bicornes*. The calyx is quadridentated, superior; the corolla quadrifid; the nut quadrangular and dispermous.

HALES OWEN, a town in Shropshire, inclosed by Worcester-shire, six miles E. of Stourbridge.

HALESWORTH, a town in Suffolk, with a market on Tuesday. It is seated on a neck of land between two branches of the river Blyth, is a thriving place, and has a trade in linen-yarn and sail-cloth. About the town is raised a great deal of hemp. It is 28 miles N. E. of Ipswich, and 101 N. E. of London. Lon. 1. 40. E. Lat. 52. 25. N.

HALF-BLOOD, in law, is where a man marries a second wife, the first being dead, and by the first venter he has a son, and by his second venter has likewise a son; the two brothers, in this case, are but of half-blood. See CONSANGUINITY and DESCENT.

HALF-Merk; a noble, or 6s. 8d.

HALF-Moon, in fortification; an outwork composed of two faces, forming a salient angle, whose gorge is in form of a crescent or half-moon, whence the name. See FORTIFICATION.

HALFPENNY, a well known copper coin, whose value is expressed by its name, in reference to the penny.

HALI-BEIGH, first dragoman or interpreter at the Grand Signior's court in the 17th century, was born of Christian parents in Poland; but having been taken by the Tartars when he was young, they sold him to the Turks, who brought him up in their religion in the seraglio. His name, in his native country, was Bobowiki. He learnt many languages, and Sir Paul Ricaut owns he was indebted to him for several things which he relates in his *Present state of the Ottoman empire*. He held a great correspondence with the English, who persuaded him to translate some books into the Turkish language; and he had a mind to return into the bosom of the Christian church, but died before he could accomplish the design. Dr. Hyde published his book, *Of the liturgy of the Turks, their pilgrimages to Mecca, their circumcision and visiting of the sick*. He translated the catechism of the church of England, and the bible, into the Turkish language. The MS. is lodged in the library of Leyden. He wrote likewise a Turkish grammar and dictionary.

HALIBUT ISLAND, an island in the N. Pacific Ocean, so named by captain Cook in his last voyage, on account of the number of fish of that name they caught there, some of which weighed upward of a hundred pounds, and none less than twenty. It is seven leagues in circumference, and very low and barren. Lon. 164. 15. W. Lat. 54. 48. N.

HALICARNASSUS, in ancient geography, a principal town of Caria, said to be built by the Argives, and situated be-

tween two bays, the Ceramicus and Jafius. It was the royal residence (called *Zephyra* formerly); especially of Mausolus, made more illustrious by his monument. This monument was one of the seven wonders, and erected by Artemisia. Halicarnassus, or Halicarnassensis, was the gentilitious name of Herodotus and Dionysius. The former was called the Father of History; and the latter was not only a good historian but also a critic.

HALIÆTUS, in ornithology. See **FALCO**.

HALIEUTICS, **HALIEUTICA**, **ἈΛΙΕΥΤΙΚΑ**, formed of *ἄλιος*, *fisherman*, which is derived from *ἄλς*, *sea*; books treating of fishes, or the art of fishing. We have still extant the halieutics of Oppian.

HALIFAX, a town of Nova Scotia, in North America, on Chebucto Bay. It has a good harbour, large and safe enough to shelter a squadron of ships throughout the winter. The town has an entrenchment, and is strengthened with forts of timber. It is commodiously situated for the fishery, 789 miles N. E. of New York. W. lon. 63. 30. N. lat. 44. 45.

HALIFAX, a town in the west riding of Yorkshire, with a market on Saturday. It is seated in a hilly country, of rather difficult access, but full of people. It is the great market for stuffs, such as shalloons, calamancos, everlastings, &c. It has a large market-house, called *The New Piece Hall*, as well as various others for particular goods. It is a very large parish, and contains 12 chapels of ease, and upwards of 12,000 inhabitants. The town is handsome, with houses built of stone, and good streets, and is 40 miles W. S. W. of York, and 197 N. by W. of London. W. lon. 1. 45. N. lat. 53. 45.

HALIOTIS, the **EAR-SHELL**, a genus of insects belonging to the order of *vermes testacea*. This is an animal of the snail kind, with an open shell resembling an ear. There are seven species, distinguished by the figure of their shells. See plate 3.

HALITZ, a town of Poland, and capital of a territory of the same name, in Red Russia, with a castle. It is seated on the river Dniester. E. lon. 26. 0. N. lat. 49. 20.

HALL, in architecture, a large room at the entrance of a fine house and palace. Vitruvius mentions three kinds of halls; the tetrastyle, with four columns supporting the platfond or ceiling; the Corinthian, with columns all round let into the wall, and vaulted over; and the Egyptian, which had a peristyle of insulated Corinthian columns, bearing a second order with a ceiling. The hall is properly the finest as well as first member of an apartment: and in the houses of ministers of state, magistrates, &c. is the place where they dispatch business, and give audience. In very magnificent buildings, where the hall is larger and loftier than ordinary, and placed in the middle of the house, it is called a *saloon*. The length of a hall should be at least twice and a quarter its breadth; and in great buildings, three times its breadth. As to the height of halls, it may be two-thirds of the breadth; and, if made with an arched ceiling, it will be much handfomer, and less liable to accidents by fire. In this case, its height is found by dividing its breadth into six parts, five of which will be the height from the floor to the under side of the key of the arch.

HALL is also particularly used for a court of justice; or an edifice wherein there is one or more tribunals. In *Westminster-hall* are held the great courts of England, viz. the king's bench, chancery, common-pleas, and exchequer. In adjoining apartments is likewise held the high court of parliament. Westminster-hall was the royal palace or place of residence of our ancient kings; who ordinarily held their parliaments and courts of judicature in their dwelling-houses (as is still done by the kings of Spain), and frequently sat in person in the courts of judicature, as they still do in parliament. A great part of this palace was burnt under Henry VIII. What remains is still reserved for the said judicatories. The great hall, wherein the courts of king's-

bench, &c. are kept, is said to have been built by William Rufus; others say by Richard I. or II. It is reckoned superior in point of dimensions to any hall in Europe; being 300 feet long and 100 broad.

HALL (Joseph), an eminent prelate of the church of England, was born in 1574, and educated at Cambridge. He became professor of rhetoric in that university, and then successively was made rector of Halsted in Suffolk, presented to the living of Waltham in Essex, made prebendary of Wolverhampton, dean of Worcester, bishop of Exeter, and lastly of Norwich. His works testify his zeal against Popery, and are much esteemed. He lamented the divisions of the Protestants, and wrote something concerning the means of putting an end to them. July 1616 he attended the embassy of lord Donecaster into France, and upon his return was appointed by his majesty to be one of the divines who should attend him into Scotland. In 1618 he was sent to the synod of Dort with other divines, and pitched upon to preach a Latin sermon before that assembly. But being obliged to return from thence before the synod broke up, on account of his health, he was by the states presented with a gold medal. He wrote, 1. Miscellaneous epistles. 2. *Mundus alter et idem*. 3. A just censure of travellers. 4. The Christian Seneca. 5. Satires, in six books. 6. A century of meditations; and many other works, which, besides the above satires, make in all five volumes in folio and quarto. He died in 1656.

HALL (John), a poet of distinguished learning, was born at Durham, and educated at Cambridge, where he was esteemed the brightest genius in that university. In 1646, when he was but 19 years of age, he published his *Horæ Vacuæ*, or *Essays*; and the same year came out his poems. He translated from the Greek "Hierocles upon the golden verses of Pythagoras;" before which is an account of the ingenious translator and his works, by John Davies of Kidwelly. He died in 1656, aged 29.

HALLAGE, a fee or toll paid for cloth brought to be sold in Blackwell-hall, London.

HALLAMAS, in our old writers, the day of all-hallows, or all-saints, viz. November 1. It is one of the erofs quarters of the year which was computed, in ancient writings, from Hallamas to Candlemas.

HALLAND, a province of Gothland, in Sweden, on the W. coast of that kingdom. It is 60 miles along the coast, but not above 12 in breadth. Halmstadt is the capital.

HALLATON, a town of Leicestershire, with a market on Thursday. It is 12 miles S. E. of Leicester, and 90 N. by E. of London. E. lon. 0. 50. N. lat. 52. 32.

HALLE, a little dismantled town of Austrian Hainault. The church contains an image of the Virgin Mary, held in great veneration. It is seated on the river Senne, eight miles S. W. of Brussels. E. lon. 4. 20. N. lat. 50. 46.

HALLE, a handsome and considerable town of Germany, in the circle of Upper Saxony, and duchy of Magdeburg, with a famous university and salt-works. It is seated on the river Sale, 40 miles E. of Magdeburg. E. lon. 12. 8. N. lat. 51. 36.

HALLE, a free imperial town of Germany, in Suabia, famous for its salt-pits; seated on the river Kocher, among rocks and mountains, 37 miles N. E. of Stutgard. E. lon. 9. 52. N. lat. 49. 20.

HALLE, a town of Germany, in Tyrol, six miles N. E. of Inspruck. E. lon. 11. 33. N. lat. 47. 12.

HALLEIN, a town of Germany, in the archbishopric of Saltzburg; seated on the river Saltza, among the mountains, wherein are mines of salt, which are the chief riches of the town and country. It is seven miles S. E. of Saltzburg. E. lon. 13. 12. N. lat. 47. 33.

HALLELUJA, or **HALLELUJAH**, a term of rejoicing, sometimes sung or rehearsed at the end of verses on such occasions. The word is Hebrew; or rather, it is two Hebrew words joined together: one of them הללו, *hallelu*, and the other יהוה, *Yehovah*; an abridgement of the name of God, יהוה, *Yehovah*. The first signifies *laudate*, "praise ye;" and the other *Dominum*, "the Lord." St. Jerome first introduced the word hallelujah into the church service: for a considerable time it was only used once a year in the Latin church, viz. at Easter; but in the Greek church it was much more frequent. St. Jerome mentions its being sung at the interments of the dead, which still continues to be done in that church, as also on some occasions in the time of Lent. In the time of Gregory the Great, it was appointed to be sung all the year round in the Latin church, which raised some complaints against that pope; as giving too much into the Greek way, and introducing the ceremonies of the church of Constantinople into that of Rome. But he excused himself by alleging, that this had been the ancient usage of Rome; and that it had been brought from Constantinople at the time when the word hallelujah was first introduced under pope Damascus.

HALLER (Albert Van), an eminent physician, was born at Bern, on the 16th of October 1708. He was the son of an advocate of considerable eminence in his profession. His father had a numerous family, and Albert was the youngest of five sons. From the first period of his education, he showed a very great genius for literature of every kind: to forward the progress of his studies, his father took into his family a private tutor, named *Abraham Billodt*; and such was the discipline exerted by this pedagogue, that the accidental sight of him, at any future period of life, excited in Haller very great uneasiness, and renewed all his former terrors. According to the accounts which are given us, the progress of Haller's studies, at the earliest periods of life, was rapid almost beyond belief. When other children were beginning only to read, he was studying Bayle and Moreri; and at nine years of age he was able to translate Greek, and was beginning the study of Hebrew. Not long after this, however, the course of his education was somewhat interrupted by the death of his father; an event which happened when he was in the 13th year of his age. After this he was sent to the public school at Bern, where he exhibited many specimens of early and uncommon genius. He was distinguished for his knowledge in the Greek and Latin languages; but he was chiefly remarkable for his poetical genius: and his essays of this kind, which were published in the German language, were read and admired throughout the whole empire. In the 16th year of his age he began the study of medicine at Tübingen, under those eminent teachers Duvernoy and Camerarius; and continued there for the space of two years, when the great reputation of the justly celebrated Boerhaave drew him to Leyden. Nor was this distinguished teacher the only man from whose superior abilities he had there an opportunity of profiting. Ruysch was still alive, and Albinus was rising into fame. Animated by such examples, he spent all the day, and the greatest part of the night, in the most intense study; and the proficiency which he made, gained him universal esteem both from his teachers and fellow-students. From Holland, in the year 1727, he came to England. Here, however, his stay was but short; and it was rather his intention to visit the illustrious men of that period, than to prosecute his studies at London. He formed connections with some of the most eminent of them. He was honoured with the friendship of Douglas and Cheselden; and he met with a reception proportioned to his merit from Sir Hans Sloane, president of the Royal Society. After his visit to Britain, he went to France; and there, under those eminent masters, Winslow and Le Dran, with the latter of whom he resided during his stay in Paris, he had opportunities

of prosecuting anatomy, which he had not before enjoyed. But the zeal of our young anatomist was greater than the prejudices of the people at that period, even in the enlightened city of Paris, could admit of. An information being lodged against him to the police for dissecting dead bodies, he was obliged to cut short his anatomical investigations by a precipitate retreat. Still, however, intent on the farther prosecution of his studies, he went to Basil, where he became a pupil to the celebrated Bernoulli.

Thus improved and instructed by the lectures of the most distinguished teachers of that period, by uncommon natural abilities, and by unremitting industry, he returned to the place of his nativity in the 26th year of his age. Not long after this, he offered himself a candidate, first for the office of physician to an hospital, and afterwards for a professorship. But neither the character which he had before he left his native country, nor the fame which he had acquired and supported while abroad, was sufficient to combat the interest opposed to him. He was disappointed in both; and it was even with difficulty that he obtained, in the following year, the appointment of keeper of a public library at Bern. The exercise of this office was indeed by no means suited to his great abilities: but it was agreeable to him, as it afforded him an opportunity for that extensive reading by which he has been so justly distinguished. The neglect of his merit, which marked his first outset, neither diminished his ardour for medical pursuits, nor detracted from his reputation either at home or abroad. And soon after he was nominated a professor in the university of Göttingen, by king George II. The duties of this important office he discharged, with no less honour to himself than advantage to the public, for the space of 17 years: and it afforded him an ample field for the exertion of those great talents which he possessed. Extensively acquainted with the sentiments of others respecting the economy of the human body, struck with the diversity of opinions which they held, and sensible that the only means of investigating truth was by careful and candid experiment, he undertook the arduous task of exploring the phenomena of human nature from the original source. In these pursuits he was no less industrious than successful, and there was hardly any function of the body on which his experiments did not reflect either a new or a stronger light. Nor was it long necessary for him, in this arduous undertaking, to labour alone. The example of the preceptor inspired his pupils with the spirit of industrious exertion. Zinn, Zimmermann, Caldani, and many others, animated by a generous emulation, laboured with indefatigable industry to prosecute and to perfect the discoveries of their great master. And the mutual exertion of the teacher and his students, not only tended to forward the progress of medical science, but placed the philosophy of the human body on a more sure, and an almost entirely new, basis. But the labours of Dr. Haller, during his residence at Göttingen, were by no means confined to any one department of science. He was not more anxious to be an improver himself, than to instigate others to similar pursuits. To him, the Anatomical Theatre, the School of Midwifery, the Chirurgical Society, and the Royal Academy of Sciences at Göttingen, owe their origin. Such distinguished merit could not fail to meet with a suitable reward from the sovereign under whose protection he then taught. The king of Great Britain not only honoured him with every mark of attention which he himself could bestow, but procured him also letters of nobility from the Emperor. On the death of Dillenius, he had an offer of the professorship of botany at Oxford; the states of Holland invited him to the chair of the younger Albinus; the king of Prussia was anxious that he should be the successor of Maupertuis at Berlin. Marshal Keith wrote to him in the name of his sovereign, offering him the chancellorship of the university of Halle, vacant by the death of the celebrated Wolff. Count Orlov invited him to Russia, in the name of his

mistress the empress, offering him a distinguished place at St. Petersburg. The king of Sweden conferred on him an unsolicited honour, by raising him to the rank of knighthood of the order of the polar star; and the emperor of Germany did him the honour of a personal visit; during which he thought it no degradation of his character to pass some time with him in the most familiar conversation.

Thus honoured by sovereigns, revered by men of literature, and esteemed by all Europe, he had it in his power to have held the highest rank in the republic of letters. Yet, declining all the tempting offers which were made to him, he continued at Gottingen, anxiously endeavouring to extend the rising fame of that medical school. But after 17 years residence in that university, an ill state of health rendering him less fit for the duties of the important office which he held, he solicited and obtained permission from the regency of Hanover to return to his native city of Bern. His fellow-citizens, who might at first have fixed him among themselves, with no less honour than advantage to their city, were now as sensible as others of his superior merit. A pension was settled upon him for life, and he was nominated at different times to fill the most important offices in the state. These occupations, however, did not diminish his ardour for useful improvements. He was the first president, as well as the greatest promoter, of the Oeconomical Society at Bern; and he may be considered as the father and founder of the Orphan Hospital of that city. Declining health, however, restrained his exertions in the more active scenes of life, and for many years he was confined entirely to his own house. Even this, however, could not put a period to his utility: for, with indefatigable industry, he continued his favourite employment of writing till within a few days of his death; which happened in the 70th year of his age, on the 12th of December 1777. His *Elementa Physiologicæ* and *Bibliotheca Medicinæ* will afford, to latest posterity, undeniable proofs of his indefatigable industry, penetrating genius, and solid judgment. But he was not less distinguished as a philosopher than beloved as a man; and he was not more eminent for his improvement in every department of medical science, than for his piety to God, and benevolence to all mankind.

HALLERIA, in botany; a genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 40th order, *Perfonatæ*. The calyx is trifid; the corolla quadrifid; the filaments longer than the corolla; the berry inferior and bilocular (the fruit not yet fully described).

HALLEY (Dr. Edmund), an eminent astronomer, was the only son of a soap-boiler in London, and was born in 1656. He first applied himself to the study of the languages and sciences, but at length gave himself up wholly to that of astronomy. In 1676 he went to the island of St. Helena to complete the catalogue of fixed stars, by the addition of those that lie near the south pole; and having delineated a planisphere in which he laid them all down in their exact places, he returned to England in 1678. In the year 1680 he took what is called *the grand tour*, accompanied by his friend the celebrated Mr. Nelson. In the midway between Calais and Paris, Mr. Halley had a sight of a remarkable comet, as it then appeared a second time that year, in its return from the sun. He had the November before seen it in its descent; and now hastened to complete his observations upon it, in viewing it from the royal observatory of France. His design in this part of his tour was, to settle a friendly correspondence between the two royal astronomers of Greenwich and Paris; and in the mean time to improve himself under so great a master as Cassini. From thence he went to Italy, where he spent great part of the year 1681; but his affairs calling him home, he returned to England. In 1683 he published his *Theory of the Variation of the Magnetical Compass*; in which

he supposes the whole globe of the earth to be a great magnet, with four magnetical poles, or points of attraction: but afterwards thinking that this theory was liable to great exceptions, he procured an application to be made to king William, who appointed him commander of the Paramour pink, with orders to seek by observations the discovery of the rule of variations, and to lay down the longitudes and latitudes of his majesty's settlements in America. He set out on this attempt on the 24th of November 1698: but having crossed the line, his men grew sickly; and his lieutenant mutinying, he returned home in June 1699. Having got the lieutenant tried and cashiered, he set sail a second time in September following, with the same ship, and another of less bulk, of which he had also the command. He now traversed the vast Atlantic ocean from one hemisphere to the other, as far as the ice would permit him to go; and having made his observations at St. Helena, Brazil, Cape Verd, Barbadoes, the Madeiras, the Canaries, the coast of Barbary, and many other latitudes, arrived in September 1700; and the next year published a general chart, showing at one view the variation of the compass in all those places. Captain Halley, as he was now called, had been at home little more than half a year, when he was sent by the king to observe the course of the tides, with the longitude and latitude of the principal head-lands in the British channel; which having executed with his usual expedition and accuracy, he published a large map of the British channel. Soon after, the emperor of Germany resolving to make a convenient harbour for shipping in the Adriatic, Captain Halley was sent by queen Anne to view the two ports on the coast of Dalmatia. He embarked on the 22d of November 1702; passed over to Holland; and going through Germany to Vienna, he proceeded to Istria: but the Dutch opposing the design, it was laid aside; yet the emperor made him a present of a rich diamond-ring from his finger, and honoured him with a letter of recommendation, written with his own hand, to queen Anne. Presently after his return, he was sent again on the same business; when passing through Hanover, he supped with king George I. then electoral prince, and his sister the queen of Prussia. On his arrival at Vienna, he was the same evening presented to the emperor, who sent his chief engineer to attend him to Istria, where they repaired and added new fortifications to those of Trieste. Mr. Halley returned to England in 1703; and the same year was made professor of geometry in the university of Oxford, in the room of Dr. Wallis, and had the degree of doctor of laws conferred on him by that university. He is said to have lost the professorship of astronomy in that city, because he would not profess his belief of the Christian religion. He was scarcely settled at Oxford, when he began to translate into Latin from the Arabic, *Apollonius de sectione rationis*; and to restore the two books *De sectione spatii* of the same author, which are lost, from the account given of them by Pappus; and he published the whole work in 1706. Afterwards he had a share in preparing for the press Apollonius's Conics; and ventured to supply the whole eighth book, the original of which is also lost. He likewise added Serenus on the section of the cylinder and cone, printed from the original Greek, with a Latin translation, and published the whole in folio. In 1713 he was made secretary of the Royal Society; in 1720 he was appointed the king's astronomer at the royal observatory at Greenwich in the room of Mr. Flamsteed; and in 1729, was chosen as a foreign member of the Academy of Sciences at Paris. He died at Greenwich in 1742. His principal works are, 1. *Catalogus stellarum in firmamento*. 2. *Tabulae astronomicae*. 3. An abridgment of the astronomy of comets, &c. We are also indebted to him for the publication of several of the works of the great Sir Isaac Newton, who had a particular friendship for him, and to whom he frequently communicated his discoveries.

HALLEY'S *Quadrant*. See QUADRANT.

HALLIARDS, the ropes or tackles usually employed to hoist or lower any sail upon its respective mast or stay. See JEARS.

HALMOTE, or HALIMOTE, is the same with what we now call a *court-baron*, the word implying a meeting of the tenants of the same hall or manor. The name is still retained at Luston, and other places in Herefordshire. See MOTE.

HALMSTADT, a strong seaport of Sweden, capital of the province of Halland, situated on a bay of the North Sea, 80 miles S. S. E. of Gotheborg. E. lon. 12. 48. N. lat. 56. 39.

HALO, or CORONA, in natural history, a coloured circle appearing round the body of the sun, moon, or any of the large stars. See CORONA.

HALORAGUS, in botany; a genus of the tetragynia order, belonging to the octandria class of plants. The calyx is quadridrifid above; there are four petals; a dry plum, and a quadri-locular nut.

HALSTEAD, a town in Essex, with a market on Friday. It has long had a share in the manufactory of bays and says; and is seated on the declivity of a hill, at the foot of which runs the river Coln, 16 miles N. of Chelmsford, and 47 N. E. of London. E. lon. 0. 45. N. lat. 51. 59.

HALT, in war, a pause or stop in the march of a military body. Some derive the word from the Latin *balitus*, "breath;" it being a frequent occasion of halting to take breath: others from *alto*, because in halting they raised their pikes on end, &c.

HALTER, in the manege, a head-stall for a horse, of Hungarian leather, mounted with one, and sometimes two straps, with a second throat-band, if the horse is apt to unhalter himself. The rope by which death is usually inflicted on criminals, is also called a *halter*.

HALTER-Cast, is an excoriation of the pastern, occasioned by the halter's being entangled about the foot, upon a horse's endeavouring to rub his neck with his hinder foot. For the cure of this, anoint the place, morning and evening, with equal quantities of linseed oil and brandy, mixed together.

HALTEREN, a town of Germany, in the bishopric of Munster; seated on the river Lippe, 25 miles S. W. of Munster. E. lon. 7. 27. N. lat. 51. 40.

HALTERISTÆ, in antiquity, a kind of players at discus; denominated from a peculiar kind of discus called by the Greeks *αλτηρ*, and by the Latins *halter*. See DISCUS. Some take the discus to have been a leaden weight or ball which the vaulters bore in their hands, to secure and keep themselves the more steady in their leaping. Others will have the halter to be a lump or mass of lead or stone, with an hole or handle fixed to it, by which it might be carried; and that the halteristæ were those who exercised themselves in removing these masses from place to place. Hier. Mercurialis, in his treatise *De arte gymnastica*, l. ii. c. 12. distinguishes two kinds of halteristæ; for though there was but one halter, there were two ways of applying it. The one was to throw or pitch it in a certain manner; the other only to hold it out at arm's end, and in this posture to give themselves divers motions, swinging the hand backwards and forwards, according to the engraven figures thereof given us by Mercurialis. The halter was of a cylindrical figure, smaller in the middle, where it was held, by one diameter, than at the two ends. It was above a foot long, and there was one for each hand: it was either of iron, stone, or lead. Galen, *De tuend. valetud.* lib. i. v. & vi. speaks of this exercise, and shows of what use it is in purging the body of peccant humours; making it equivalent both to purging and phlebotomy.

HALTON, or HAULTON, i. e. *High-Town*, a town of Cheshire, 186 miles from London. It stands on a hill, where a castle was built anno 1071, and is a member of the duchy of Lancaster; which maintains a large jurisdiction in the county

round it, by the name of *Halton-Fee*, or the *honour of Halton*, having a court of record, prison, &c. within themselves. About Michaelmas every year, the king's officers of the duchy keep a law-day at the castle, which still remains a stately building; once a fortnight a court is kept here, to determine all matters within their jurisdiction; but felons and thieves are carried to the sessions at Chester, to receive their sentence. By the late inland navigation, it has communication with the rivers Mersey, Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Stafford, Warwick, Leicester, Oxford, Worcester, &c.

HALTWHISTLE, a well-built town of Northumberland, whose market is disused. It is 37 miles W. of Newcastle, and 315 N. N. W. of London. E. lon. 2. 17. N. lat. 55. 2.

HALYMOTE, properly signifies an holy or ecclesiastical court. See HALMOTE. There is a court held in London by this name before the lord mayor and sheriffs, for regulating the bakers. It was anciently held on Sunday next before St. Thomas's day, and for this reason called the *Halymote*, or *Holy-court*.

HALYS, in ancient geography, the noblest river of the Hither Asia, through which it had a long course, was the boundary of Cræsus's kingdom to the east. Running down from the foot of mount Taurus, through Cataonia and Cappadocia, it divided almost the whole of the Lower Asia, from the sea of Cyprus down to the Euxine, according to Herodotus; who seems to extend its course too far. According to Strabo, himself a Cappadocian, it had its springs in the Great Cappadocia. It separated Paphlagonia from Cappadocia; and received its name *απο του αλτος*, from salt, because its waters were of a salt and bitter taste, from the nature of the soil over which they flowed. It is famous for the defeat of Cræsus king of Lydia, who was misled by the ambiguous words of this oracle: *Χροισος αλυν διαβας μεγαλην αρχην διαλυσει*. "If Cræsus passes over the Halys he shall destroy a great empire." That empire was his own.

HALYWERC FOLK, in old writers, were persons who enjoyed land, by the pious service of repairing some church, or defending a sepulchre. This word also signified such persons in the diocese of Durham, as held their lands to defend the corpse of St. Cuthbert, and who from thence claimed the privilege of not being forced to go out of the bishopric.

HAM, a Saxon word used for "a place of dwelling;" a village or town: hence the termination of some of our towns, *Nottingham*, *Buckingham*, &c. Also a home close, or little narrow meadow, is called a *ham*.

HAM, is also a part of the leg of an animal; being the inner or hind part of the knee, or the ply or angle in which the leg and thigh, when bent, incline to each other.

HAM, in commerce, &c. denotes a leg or thigh of pork, dried, seasoned, and prepared, to make it keep and to give it a savoury agreeable flavour. *Westphalia* hams, so much in vogue, are prepared by salting them with saltpetre, pressing them in a press eight or ten days, then steeping them in juniper-water, and drying them by the smoke of juniper-wood. A common ham may be salted in imitation of those of *Westphalia*, by sprinkling it with salt for one day, in order to fetch out the blood; then wiping it dry, and rubbing it with a mixture of a pound of brown sugar, a quarter of a pound of saltpetre, half a pint of bay salt, and three pints of common salt, well stirred together in an iron pan over the fire till they are moderately hot: let it lie three weeks in this salting, and be frequently turned, and then dry it in a chimney.

HAM, a strong town of Germany, in *Westphalia*, capital of the county of Marck. It is seated on the river Lippe, twenty-

four miles south of Munster. E. lon. 7. 50. N. lat. 51. 36.

HAM, a town of France, in the department of Somme and late province of Picardy, seated on the river Somme, 10 miles N. of Noyon, and 48 N. of Paris. E. lon. 3. 6. N. lat. 49. 45.

HAM, a village in Surry, between Peterham and Kingston, the houses of which surround a pleasant common. Near it is Ham House, the seat of the earl of Dyfart, and Ham Walks, celebrated by Thomson and others. This village, which is a hamlet to Kingston, is 11 miles W. S. W. of London,

West HAM, a village of Essex, where are the remains of an opulent abbey, founded in 1135. This village is seated on the river Lea, about four miles E. by N. of London.

East HAM, a village in Essex, adjoining to West Ham. In this parish is a spring called Miller's Well, the excellent water of which has never been known to freeze, or to vary in its height. A part of Kent, in the parish of Woolwich, lies on this side of the Thames, and divides the parish of East Ham from that river.

HAMADAN. See AMADAN.

HAMADRYADES, of ἄμα together, and δρυας dryad, of δρυς oak, in antiquity, certain fabulous deities revered among the ancient heathens, and believed to preside over woods and forests, and to be inclosed under the bark of oaks. The hamadryades were supposed to live and die with the trees they were attached to; as is observed by Servius on Virgil, Eclog. x. ver. 62. after Mnesimachus, the scholiast of Apollonius, &c. who mentions other traditions relating thereto. The poets, however, frequently confound the Hamadryads with the Naiads, Napææ, and rural nymphs in general; witness Catullus, Carm. lxviii. ver. 23. Ovid, Fast. iv. 229. Met. i. ver. 695. xiv. ver. 628. Propertius, Eleg. xx. 32. Virg. Eccl. x. ver. 64. Georg. iv. ver. 382, 383. Festus calls them *Querquetulanæ*, as being issued or sprung from oaks. An ancient poet, Pherecrates, in *Athenæus*, lib. iii. calls the vine, fig-tree, and other fruit-trees, *hamadryades*, from the idea of their mother the oak. This common idea among the ancients, of nymphs or intellectual beings annexed to trees, will account for their worshipping of trees; as we find they did, not only from their poets but their historians. Livy speaks of an ambassador's addressing himself to an old oak, as to an intelligent person and a divinity. Lib. iii. § 25.

HAMAH, a large town of Asia, in Syria, seated among the hills. The houses being built on the ascent of a hill, one above another, make a very agreeable appearance. Many of the best houses are half ruined; but those that are still standing, with the mosques, are built of black and white stones, as well as the castle. The river Afs, formerly called Orontes, runs close by the castle, and fills the ditches about it, which are cut deep into the solid rock. The market-places are pretty good; and they have a trade for linen of their own manufacture. It is 78 miles S. W. of Aleppo. E. lon. 34. 55. N. lat. 36. 15.

HAMAMELIS, WITCH HAZEL; a genus of the digynia order, belonging to the tetrandria class of plants; and in the natural method ranking with those of which the order is doubtful. The involucre is triphyllous, the proper calyx is tetraphyllous; there are four petals; the nut horned and bilocular. There is but one species, a native of Virginia. It hath a shrubby or woody stem, branching three or four feet high; oval, indented, alternate leaves, resembling those of common hazel; and flowers growing in clusters from the joints of the young branches, but not succeeded by seeds in this country. The plant is hardy, and is admitted as a variety in our gardens; but its flowers are more remarkable for their appearing in November and December, when the leaves are fallen, than for their beauty. It may be propagated either by seeds or layers.

HAMAM LEEF, a town 12 miles east from Tunis, noted for its hot baths, which are much resorted to by the Tunifans, and deemed efficacious in the rheumatism and many other complaints. Here the Bey has a very fine bath, which he frequently permits the consuls and other persons of distinction to use.

HAMAMET, a town of Africa, in Barbary, seated on a gulf of the same name, 45 miles from Tunis. E. lon. 10. 15. N. lat. 36. 35.

HAMAXOBII, HAMAXOBIANS, in the ancient geography, a people who had no houses, but lived in carriages. The word is formed from ἀμαξία a carriage or chariot, and βίη life. The *Hamaxobii*, called also *Hamaxobitæ*, were an ancient people of Sarmatia Europæa, inhabiting the southern part of Muscovy, who instead of houses had a sort of tents made of leather, and fixed on carriages to be ready for shifting and travel.

HAMB DEN (John), a celebrated patriot, descended of the ancient family of Hambden in Buckinghamshire, was born in 1594. From the university he went to the inns of court, where he made a considerable progress in the study of the law. He was chosen to serve in the parliament which began at Westminster February 5, 1626; and served in all the succeeding parliaments in the reign of Charles I. In 1636 he became universally known, by his refusal to pay ship-money, as being an illegal tax; upon which he was prosecuted, and his carriage throughout this transaction gained him a great character. When the long parliament began, the eyes of all men were fixed on him as their *pater patriæ*. On January 3, 1642, the king ordered articles of high treason and other misdemeanours to be prepared against Lord Kimbolton, Mr. Hambden, and four other members of the House of Commons, and went to that house to seize them: but they were then retired. Mr. Hambden afterwards made a speech in the house to clear himself of the charge laid against him. In the beginning of the wars he commanded a regiment of foot, and did good service to the parliament at the battle of Edge-hill. He received a mortal wound in an engagement with Prince Rupert, in Chalgrave-field in Oxfordshire, and died in 1643. He is said to have had the art of Socrates to a great degree, of interrogating, and under the notion of doubts, insinuating objections, so that he infused his own opinions into those from whom he pretended to learn and receive them. 'He was, say his panegyrists, a very wise man and of great parts; and possessed of the most absolute spirit of popularity to govern the people, that ever was in any country: He was master over all his appetites and passions, and had thereby a very great ascendant over other men's: He was of an industry and vigilance never to be tired out, of parts not to be imposed upon by the most subtle, and of courage equal to his best parts.

HAMBURGH, one of the largest towns in Germany, consisting of the Old Town and the New Town; both nearly of an equal size. Most of the houses are built after the manner of the Dutch, and richly furnished within. The principal streets of the Old Town have long and broad canals, which are filled twice every 24 hours by the tide. These are not only useful for trade, but serve to keep the houses and the streets clean. It is seated on the river Elbe, which is of vast advantage to the inhabitants; and on the side of Holstein is the Alster, which, before it enters the town by sluices, forms a fine basin that cannot be equalled in Germany. Hamburgh is well fortified, and on the ramparts are handsome walks. The burghers mount guard themselves, and are divided into several companies. The streets are well lighted every night; and there is a guard which patrols all over the city. This is a pleasant place for foreigners: because, beside the cheapness of provisions, they are sure to meet with people of their own nation; and there are operas, plays, assemblies, balls, concerts, masquerades, and other parties of pleasure for their diversion. The senate of this town is composed of four

burgo-masters, of whom one only is a tradesman; 4 syndics; 24 senators, of whom 11 are men of letters, and the rest tradesmen; four secretaries, one of whom is a prothonotary, and another belongs to the archives; so that the whole senate consists of 36 persons. The town is divided into five parishes; and out of each are formed several colleges, or companies, who take care of public affairs, unless there is any thing too high for their determination, and then it is judged by a sort of general assembly. It is a place of great trade; which they carry on with Portugal, Spain, France, England, Denmark, Norway, Sweden, Italy, and Russia. They also send vessels every year to Greenland to catch whales; and there are not less than 200 ships at a time, belonging to foreign merchants, at anchor before the city: and there is a handsome exchange. The inhabitants are all Lutherans, and none but the English have the liberty of performing divine service in a chapel of their own. Other religions are tolerated at Altena, a large town near the harbour of Hamburg; except the Jews, who have no synagogue. Beside the 5 principal churches, they have 11 smaller ones for particular occasions, some of which belong to hospitals. The cathedral of Our Lady is a very fine structure, and has a chapter, consisting of 12 canons, who are all Protestants. It is 55 miles N. E. of Bremen. E. lon. 9. 55. N. lat. 53. 34.

HAMEL (John Baptiste du), a very learned French philosopher and writer in the 17th century. At 18 he wrote a treatise, in which he explained in a very simple manner, Theodosius's three books of Spherics; to which he added a tract upon trigonometry, extremely perspicuous, and designed as an introduction to astronomy. Natural philosophy, as it was then taught, was only a collection of vague, knotty, and barren questions; when our author undertook to establish it upon right principles, and published his *Astronomia Physica*. In 1666 Mr. Colbert proposed to Louis XIV. a scheme, which was approved of by his majesty, for establishing a royal academy of sciences; and appointed our author secretary of it. He published a great many books; and died at Paris in 1706, of mere old age, being almost 83. He was regius professor of philosophy, in which post he was succeeded by M. Varignon. He wrote Latin with purity and elegance.

HAMELBURGH, a town of Germany, in Franconia, and in the territory of the abbey of Fuld; seated on the river Saab, 28 miles S. E. of Fuld. E. lon. 10. 12. N. lat. 50. 16.

HAMELIN, a strong town of Germany, in the duchy of Calenberg in Lower Saxony. It is situated at the extremity of the duchy of Brunswick, to which it is the key, near the confluence of the rivers Hamel and Weser, in E. lon. 9. 55. N. lat. 52. 13.

HAMELLIA, in botany; a genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is quinquesid; the berry quinquelocular, inferior, polyspermous.

HAMELSECKEN. BURGLARY, or *Nocturnal House breaking*, was by the ancient English law called *Hamesecken*, as it is to this day in Scotland; where violating the privilege of a man's house is as severely punished as ravishing a woman.

HAMI, or HA-MI, a country of Asia, subject to the Chinese. It is situated to the north-east of China, at the extremity of that desert which the Chinese call *Chamo*, and the Tartars *Cobi*; and is only 90 leagues distant from the most westerly point of the province of Chenti. This country was inhabited in the early ages by a wandering people, named *Iung*. About the year 950 before the Christian era, they sent deputies to pay homage to the emperor of China, and presented some sabres by way of tribute. The civil wars by which China was torn about

the end of the dynasty of Tcheou having prevented assistance from being sent to these people, they fell under the dominion of the Hiongnou, who appear to have been the same as the Huns, and who at that time were a formidable nation. The Chinese several times lost and recovered the country of Hami. Though surrounded by deserts, this country is accounted one of the most delightful in the world. The soil produces abundance of grain, fruits, leguminous plants, and pasture of every kind. The rice which grows there is particularly esteemed in China; but the most useful and most esteemed production of this country is its dried raisins, which are of two kinds: The first, much used in Chinese medicine, have a near resemblance to those known in Europe by the name of Corinthian. The second, which are in much greater request for the table, are smaller and more delicate than those of Provence. The emperor caused plants of both kinds to be transported from Hami to Peking; and as these have been cultivated with extraordinary care, the raisins produced by them have a most exquisite flavour. Although the country of Hami (the latitude of which is 42° 53' 20") lies farther towards the north than several of the departments of France, its climate is said to be more favourable to the culture of vines. The kingdom contains a great number of villages and hamlets; but it has properly only one city, which is its capital, and has the same name. The country is very abundant in fossils and valuable minerals: the Chinese have, for a long time, procured diamonds, and a great deal of gold from it; at present it supplies them with a kind of agate, on which they set a great value. The inhabitants of this small state are brave, capable of enduring fatigue, very dexterous in all bodily exercises, and make excellent soldiers; but they are fickle and soon irritated, and when in a passion they are extremely ferocious and sanguinary.

HAMILTON, a town of Lanerksire, in Scotland, which contains many handsome houses, with the ruins of a collegiate church, founded in 1451. Near this town is Hamilton House, the magnificent seat of the duke of Hamilton, seated between the Clyde and Avon, and surrounded by venerable oaks. The town also is situated on the Clyde, 10 miles S. E. of Glasgow. W. lon. 4. 16. N. lat. 55. 58.

HAMILTON (Anthony, count), descended from a noble family in Scotland, was born in Ireland, and settled in France. He wrote several poetical pieces; and was the first who composed romances in an agreeable taste, without imitating the burlesque of Scarron. He is also said to be the author of the *Memoirs of the Count de Grammont*, one of the best written pieces in the French language. His works were printed in 6 vols. 12mo. He died at St. Germaine en Laye, in 1720.

HAMLET, HAMEL, or *Hampfel*, (from the Saxon *ham*, i. e. *domus*, and the German *let*, i. e. *membrum*), signifies a little village, or part of a village or parish; of which three words the first is now only used, though Kitchen mentions the two last. By Spelman there is a difference between *villam integram*, *villam dimidiam*, and *hamletum*; and Stow expounds it to be the seat of a freeholder. Several county towns have hamlets, as there may be several hamlets in a parish; and some particular places may be out of a town or hamlet, though not out of the county.

HAMLET, a prince, celebrated in the annals of Denmark; and whose name has been rendered familiar in this country, and his story interesting, by being the subject of one of the noblest tragedies of our immortal Shakespeare. Adjoining to a royal palace, which stands about half a mile from that of Cronborg in Elsinour, is a garden, which, Mr. Coxe informs us, is called Hamlet's Garden, and is said by tradition to be the very spot where the murder of his father was perpetrated. The house is of modern date, and is situated at the foot of a sandy ridge near the sea. The garden occupies the side of the hill, and is laid out in ter-

passes rising one above another. Elſineur is the ſcene of Shakeſpeare's Hamlet; and the original hiſtory from which our poet derived the principal incidents of his play is founded upon facts, but ſo deeply buried in remote antiquity, that it is difficult to diſcriminate truth from fable. Saxo-Grammaticus, who flouriſhed in the 12th century, is the earlieſt hiſtorian of Denmark that relates the adventures of Hamlet. His account is extracted, and much altered, by Belleforeſt a French author; an Engliſh tranſlation of whoſe romance was publiſhed under the title of the Hiſtorye of Hamblet: and from this tranſlation Shakeſpeare formed the ground-work of his play, though with many alterations and additions. The following ſhort ſketch of Hamlet's hiſtory, as recorded in the Daniſh annals, will enable the reader to compare the original character with that delineated by Shakeſpeare.

Long before the introduction of Chriſtianity into Denmark, Horwendillus, preſect or king of Jutland, was married to Geruthra, or Gertrude, daughter of Ruric king of Denmark, by whom he had a ſon called *Amlettus*, or *Hamlet*. Fengo murders his brother Horwendillus, marries Gertrude, and aſcends the throne. Hamlet, to avoid his uncle's jealousy, counterfeits folly; and is repreſented as ſuch an abhorrer of falſhood, that though he conſtantly frames the moſt evaſive and even abſurd anſwers, yet artfully contrives never to deviate from truth. Fengo, ſuſpecting the reality of his madneſs, endeavours, by various methods, to diſcover the real ſtate of his mind: amongſt others, he departs from Elſineur, concerts a meeting between Hamlet and Gertrude, concluding that the former would not conceal his ſentiments from his own mother; and orders a courtier to conceal himſelf, unknown to both, for the purpoſe of overhearing their converſation. The courtier repairs to the queen's apartment, and hides himſelf under a heap of ſtraw. Hamlet, upon entering the cabinet, ſuſpecting the preſence of ſome ſpy, imitates, after his uſual affectation of folly, the crow of a cock, and, ſhaking his arms like wings, jumps upon the heap of ſtraw; till, feeling the courtier, he draws his ſword and inſtantly diſpatches him. He then cuts the body to pieces, boils it, and gives it to the hogs. He then avows to his mother that he only perſonated a fool, reproaches her for her inceſtuous marriage with the murderer of her huſband; and concludes his remonſtrances by ſaying, "Inſtead, therefore, of condoling my insanity, deplore your own infamy, and learn to lament the deformity of your own mind." The queen is ſilent; but is recalled to virtue by theſe admonitions. Fengo returns to Elſineur, ſends Hamlet to England under the care of two courtiers, and requeſts the king by a letter to put him to death. Hamlet diſcovers and alters the letter; ſo that, upon their arrival in England, the king orders the two courtiers to immediate execution, and betrothes his daughter to Hamlet, who gives many aſtoniſhing proofs of a moſt tranſcendent underſtanding. At the end of the year he returns to Denmark, and alarms the court by his unexpected appearance; as a report of his death had been ſpread, and preparations were making for his funeral. Having reſumed his affected insanity, he purpoſely wounds his fingers in drawing his ſword, which the byſtanders immediately faſten to the ſcabbard. He afterwards invites the principal nobles to an entertainment, makes them intoxicated, and in that ſtate covers them with a large curtain, which he faſtens to the ground with wooden pegs: he then ſets fire to the palace; and the nobles, being enveloped in the curtain, periſh in the flames. During this tranſaction he repairs to Fengo's apartment; and, taking the ſword which lay by the ſide of his bed, puts his own in its place: he inſtantly awakens and informs him, that Hamlet is come to revenge the murder of his father. Fengo ſtarts from his bed, ſeizes the ſword; but, being unable to draw it, falls by the hand of Hamlet. The next morning, when the populace were aſſembled to view the ruins of the palace, Ham-

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let ſummons the remaining nobles; and in a maſterly ſpeech, which is too long to inſert in this place, lays open the motives of his own conduct, proves his uncle to have been the aſſaſſin of his father; and concludes in the following words: "Tread upon the aſhes of the monſter, who, polluting the wife of his murdered brother, joined inceſt to parricide, and ruled over you with the moſt oppreſſive tyranny. Receive me as the miniſter of a juſt revenge, as one who felt for the ſufferings of his father and his people. Conſider me as the perſon who has purged the diſgrace of his country; extinguished the infamy of his mother; freed you from the deſpotiſm of a monſter, whoſe crimes, if he had lived, would have daily increaſed, and terminated in your deſtruction. Acknowledge my ſervices; and if I have deſerved it, preſent me with the crown. Behold in me the author of theſe advantages: no degenerate perſon, no parricide; but the rightful ſucceſſor to the throne, and the pious avenger of a father's murder. I have reſcued you from ſlavery, reſtored you to liberty, and re-eſta bliſhed your glory: I have deſtroyed a tyrant, and triumphed over an aſſaſſin. The recompenſe is in your hands: you can eſtimate the value of my ſervices, and in your virtue I reſt my hopes of reward." This ſpeech has the deſired effect: the greater part of the aſſembly ſhed tears, and all who are preſent unanimouſly proclaim him king amid repeated acclamations.

Hamlet, ſoon after his elevation, ſails to England, and orders a ſhield to be made on which the principal actions of his life are repreſented. The king receives him with feigned demonſtrations of joy, falſely aſſures him that his daughter is dead, and recommends him to repair to Scotland as his ambaffador, and to pay his addreſſes to the queen Hermetruda. He gives this inſidious advice with the hopes that Hamlet may periſh in the attempt; as the queen, who was remarkable for her chaſtity and cruelty, had ſuch an averſion to all propoſals of marriage, that not one of her ſuitors had eſcaped falling a ſacrifice to her vengeance. Hamlet, in oppoſition to all difficulties, performs the embaſſy; and, by the aſſiſtance of his ſhield, which inſpires the lady with a favourable opinion of his wiſdom and courage, obtains her in marriage, and returns with her to England. Informed by the princeſs to whom he had been betrothed that her father meditates his aſſaſſination, Hamlet avoids his fate by wearing armour under his robe; puts to death the king of England; and ſails to Denmark with his two wives, where he is ſoon afterwards killed in a combat with Vigletus ſon of Ruric. Hamlet, adds the hiſtorian, was a prince, who, if his good fortune had been equal to his deſerts, would have rivalled the gods in ſplendor, and in his actions would have exceeded even the labours of Hercules.

HAMMER, a well-known tool uſed by mechanics, conſiſting of an iron head, fixed croſſwiſe upon a handle of wood. There are ſeveral ſorts of hammers uſed by blackſmiths; as, 1. The *hand-hammer*, which is of ſuch weight that it may be wielded or governed with one hand at the anvil. 2. The *up-band ſledge*, uſed with both hands, and ſeldom lifted above the head. 3. The *about-ſledge*, which is the biggeſt hammer of all, and held by both hands at the fartheſt end of the handle; and, being ſwung at arm's length over the head, is made to fall upon the work with as heavy a blow as poſſible. 4. There is alſo another hammer uſed by ſmiths, called a *rivetting-hammer*; which is the ſmalleſt of all, and is ſeldom uſed at the forge unleſs upon ſmall work. Carpenters and joiners have likewiſe hammers accommodated to their ſeveral purpoſes.

HAMMERING, the act of beating or extending and faſhioning a body under the hammer. When it is performed on iron heated for the purpoſe, the ſmiths uſually call it *forging*. In coining a piece of money, or a medal, it is ſaid to be *hammered*, when it is ſtruck, and the impreſſion given with a hammer, and not with a mill.

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HAMMERSMITH, a large village of Middlesex, in the parish of Fulham, four miles W. of London, and a little to the N. of the Thames.

HAMERSTEIN, a fortress of Germany, upon the Rhine, opposite Coblenz, belonging to the elector of Treves.

HAMMOCK, or **HAMAC**, a kind of hanging bed, suspended between two trees, posts, hooks, or the like, much used throughout the West Indies, as also on board of ships. The Indians hang their hammocks to trees, and thus secure themselves from wild beasts and insects, which render lying on the ground there very dangerous. According to F. Plumier, who has often made use of the hammock in the Indies, it consists of a large strong coverlet or sheet of coarse cotton, about six feet square: on two opposite sides are loops of the same stuff, through which a string is run, and thereof other loops are formed, all which are tied together with a cord; and thus is the whole fastened to two neighbouring trees in the field, or two hooks in houses. This kind of couch serves at the same time for bed, quilts, sheets, pillow, &c. The hammock used on board of ships is made of a piece of canvas six feet long and three feet wide, gathered or drawn together at the two ends. There are usually from fourteen to twenty inches in breadth allowed between decks for every hammock in a ship of war; but this space must in some measure depend on the number of the crew, &c. In time of battle the hammocks and bedding are firmly corded and fixed in the nettings on the quarter-deck, or wherever the men are too much exposed to the view or fire of the enemy.

HAMMOND (HENRY), D. D. one of the most learned English divines in the 17th century, was born in 1605. He studied at Oxford, and in 1629 entered into holy orders. In 1633 he was inducted into the rectory of Penshurst in Kent. In 1643 he was made archdeacon of Chichester. In the beginning of 1645 he was made one of the canons of Christ church, Oxford, and chaplain in ordinary to king Charles I. who was then in that city; and he was also chosen public orator of the university. In 1647 he attended the king in his confinement at Woburn, Cavesham, Hampton-Court, and the Isle of Wight, where he continued till his majesty's attendants were again put from him. He then returned to Oxford, where he was chosen sub-dean; and continued there till the parliament-visitors first ejected him, and then imprisoned him for several weeks in a private house in Oxford. During this confinement he began his Annotations on the New Testament. At the opening of the year 1660, when every thing visibly tended to the restoration of the royal family, the doctor was desired by the bishops to repair to London to assist there in the composition of the breaches of the church, his station in which was designed to be the bishopric of Worcester; but on the 4th of April he was seized by a fit of the stone, of which he died on the 25th of that month, aged 55. Besides the above work, he wrote many others; all of which have been published together in four volumes folio.

HAMMOND (Anthony, Esq.), an ingenious English poet, descended from a good family of Somersham Place in Huntingdonshire, was born in 1668. After a liberal education at St. John's-college, Cambridge, he was chosen member of parliament, and soon distinguished himself as a fine speaker. He became a commissioner of the royal navy, which place he quitted in 1712. He published a Miscellany of original Poems by the most eminent hands; in which himself, as appears by the poems marked with his own name, had no inconsiderable share. He wrote the life of Walter Moyle, Esq. prefixed to his works; being the intimate friend of that gentleman. Mr. Hammond died about the year 1726.

HAMMOND (James), known to the world by the Love-Elegies which some years after his death were published by the earl of Chesterfield, was the son of Anthony Hammon above-

mentioned, and was preferred to a place about the person of the late prince of Wales, which he held till an unfortunate accident deprived him of his senses. The cause of this calamity was a passion he entertained for a lady, who would not return it: upon which he wrote those love-elegies which have been so much celebrated for their tenderness. The editor observes, that he composed them before he was 21 years of age: a period, says he, when fancy and imagination commonly riot at the expence of judgment and correctness. He was sincere in his love, as in his friendship; and wrote to his mistress, as he spoke to his friends, nothing but the genuine sentiments of his heart. Tibullus seems to have been the model our author judiciously preferred to Ovid; the former writing directly from the heart to the heart, the latter too often yielding and addressing himself to the imagination. Mr. Hammond died in the year 1743, at Stow, the seat of lord Cobham, who, as well as the earl of Chesterfield, honoured him with a particular intimacy.

HAMONT, a town of Germany, in the bishopric of Liege, 17 miles W. of Ruremonde. Lon. 5. 31. E. Lat. 51. 17. N.

HAMPSHIRE, **HANTS**, or *Southampton*, a county of England, bounded on the N. by Berks, on the E. by Surry and Sussex, on the S. by the English Channel, and on the W. by Dorsetshire and Wilts. It extends, exclusive of the Isle of Wight, 42 miles from N. to S. and 38 from E. to W. It is divided into 39 hundreds, and contains one city, 20 market-towns, and 253 parishes; and sends, with the Isle of Wight, 26 members to parliament. It is one of the most agreeable, fertile, and populous counties in England. The air, in the higher parts, is clear and pure; toward the sea, mild, and inclined to moisture. Its products are the finest corn (especially wheat), hops, cattle, sheep, wool, excellent bacon, honey, and timber. For the last it has been particularly famous, on account of its great woods, of which the principal are the New Forest, and the forest of East Bere. The principal rivers are the Avon, Test, Itchen, and Stour.

New HAMPSHIRE, one of the United States of North America, bounded on the N. by Canada; on the N. E. by the province of Main; on the S. E. by the Atlantic Ocean; on the S. by Massachusetts; and on the W. and N. W. by the river Connecticut, which separates it from Vermont. It is divided into the five counties of Rockingham, Stafford, Hillsborough, Cheshire, and Grafton. The land near the sea is generally low, but, advancing into the country, it rises into hills. The air is serene and healthful; the weather not so subject to variation as in the more southern climes. From the vicinity of some mountains, whose summits are covered with snow three quarters of the year, this country is intensely cold in winter. In summer the heat is great, but of short duration. The capital is Portsmouth.

HAMPSTEAD, a village of Middlesex, formerly famous for its medicinal waters. It is seated on the declivity of a hill, on the top of which is a fine heath that commands a delightful prospect of the metropolis and all the adjacent country. It is four miles N. N. W. of London.

HAMPTON, a town in Gloucestershire, with a market on Tuesday. It is seated on the Cotswold Hills, 14 miles S. of Gloucester, and 90 W. of London. Lon. 2. 15. W. Lat. 51. 36. N.

HAMPTON, a seaport of N. America, in New Hampshire, 40 miles N. of Boston. Lon. 74. 0. W. Lat. 43. 5. N.

HAMPTON, a town of Middlesex, famous for a royal palace, called Hampton Court, built by cardinal Woolsey, who gave it to Henry VIII. The buildings, gardens, and parks, to which king William made many additions, are four miles in circumference, and seated on the N. side of the Thames, 14 miles S. W. of London. Lon. 0. 9. W. Lat. 51. 25. N.

HAMESOKEN, or **HAMESECKEN**. See **HAMESECKEN**

HANAPER, or **HAMPER**, an office in chancery, under the direction of a master, his deputy, and clerks, answering, in some measure, to the *scriba* among the Romans. The *Clerk of the Hanaper* is sometimes styled *Warden of the hanaper*. He receives all money due to the king for seals of charters, patents, commissions, and writs, and attends the keeper of the seal daily in term time, and at all times of sealing, and takes into his custody all sealed charters, patents, and the like, which he receives into bags; but anciently, it is supposed, into hampers, which gave denomination to the office. There is also a *comptroller* of the hanaper.

HANAU, a handsome and strong town of Germany, in the circle of the Lower Rhine, capital of a county of the same name. It belongs to its own prince. It is divided into two towns, the Old and the New, and is seated near the river Maine, 18 miles N. E. of Darmstadt. Lon. 8. 55. E. Lat. 49. 56. N.

HANAU, the county of, bounded on the E. by the county of Rhinec and the territory of Fuld; on the W. by the counties of Weissemburg and Solms; and on the N. and S. by the territories of Mentz and Francfort. It is 45 miles in length, but its breadth is small. Its soil is very fruitful.

HAND, a part or member of the body of man, making the extremity of the arm. See *ANATOMY*, page 167. The mechanism of the hand is excellently contrived to fit it for various uses and occasions. It consists of a compages of muscles, tendons, and little bones connected with each other, which give it a great degree of strength, and at the same time an unusual flexibility, to enable it to handle adjacent bodies, lay hold of them, and grasp them, in order either to draw them toward us or thrust them off. Anaxagoras is represented by ancient authors, as maintaining, that man owes all his wisdom, knowledge, and superiority over other animals, to the use of his hands. Galen represents the matter otherwise: man, according to him, is not the wisest creature, because he has hands; but he had hands given him because he was the wisest creature. He truly said it was not our hands that taught us arts, but our reason which directed us in the use of our hands.

In scripture, the word *hand* was variously applied. To pour water on any one's hand, signified to *serve* him. To wash the hands was a ceremony made use of to denote innocency from murder or manslaughter. To kiss the hand was an act of adoration. To fill the hand signified taking possession of the priesthood, and performing its functions. To lean upon any one's hand was a mark of familiarity and superiority. To give the hand signifies to grant peace, swear friendship, promise security, or make alliance. The right hand was the place of honour and respect. Amongst the Greeks and Romans it was customary for inferiors to walk on the left hand of superiors, that their right hand might be ready to afford protection and defence to their left side, which was, on account of the awkwardness of the left hand, more exposed to danger.

Imposition or *laying on* of **HANDS**, signifies the conferring of holy orders; a ceremony wherein the hands are laid on the head of another, as a sign of a mission, or of a power given him to exercise the functions of the ministry belonging to the order. The apostles began to appoint missionaries by the imposition of hands. See *IMPOSITION*.

HAND, in falconry, is used for the foot of the hawk. To have a clean, strong, slender, glutinous hand, well clawed, are some of the good qualities of a hawk or falcon.

HAND, in the manege, sometimes stands for the fore-feet of a horse. It is also used for a division of the horse into two parts, with respect to the rider's hand. The fore-hand includes the head, neck, and fore-quarters; the hind hand is all the rest of the horse.

HAND is likewise used for a measure of four inches, or of a clenched fist, by which the height of a horse is computed.

HAND is also figuratively used in painting, sculpture, &c. to indicate the *manner* or style of this or that master.

HANDS are borne in coat-armour, *dexter* and *sinister*; that is, right and left, expanded or open; and after other manners. A bloody hand in the centre of the escutcheon is the badge of a baronet of Great Britain.

HAND-Breadth, a measure of three inches.

HANDEL (George Frederic), a most eminent master and composer of music, was born at Hall, a city of Upper Saxony in Germany. His father was a physician and surgeon of that place, and was upwards of 60 years of age when Handel was born. During his infancy young Handel is said to have amused himself with musical instruments, and to have made considerable progress before he was seven years of age, without any instructions. His propensity for music at last became so strong, that his father, who designed him for the study of the civil law, thought proper to forbid him, even at this early period of life, to touch a musical instrument, and would suffer none to remain in his house. Notwithstanding this prohibition, however, Handel found means to get a little clavichord privately conveyed to a room in the uppermost story of the house, to which room he constantly stole when the family were asleep; and thus made such advances in his art, as enabled him to play on the harpsichord. He was first taken notice of by the duke of Saxe Weisenfels, on the following occasion. His father went to pay a visit to another son by a former wife, who was valet de chambre to the duke, and resided at his court. Young Handel, being then in his seventh year, earnestly desired permission to go along with him; but being refused, he followed the chaise on foot, and overtook it, the carriage being probably retarded by the roughness of the way. His father at first chid him for his disobedience, but at last took him into the chaise along with him. While he was in the duke's court, he still continued to show the same inclination for music: it was impossible to keep him from harpsichords; and he used sometimes to get into the organ-loft at church, and play after service was over. On one of these occasions, the duke happening to go out later than usual, found something so uncommon in Handel's manner of playing, that he inquired of his valet who it was; and receiving for answer that it was his brother, he desired to see him. This nobleman was so much taken with the musical genius shown by young Handel, that he persuaded his father to let him follow the bent of his inclination. He made the boy a present; and told him, that if he minded his studies, no encouragement should be wanting.

On his return to Hall, Handel was placed under one Zackaw, the organist of the cathedral church; and our young musician was even then able to supply his master's place in his absence. At nine years of age he began to compose church-services for voices and instruments, and continued to compose one such service every week for three years successively. At the age of 14, he far excelled his master, as he himself owned; and he was sent to Berlin, where he had a relation in some place about the court, on whose care and fidelity his parents could rely. The opera was then in a flourishing condition, being encouraged by the grandfather of the late king of Prussia, and under the direction of many eminent persons from Italy, among whom were Buononcini and Attilio. Buononcini being of a haughty disposition, treated Handel with contempt; but Attilio behaved to him with great kindness, and he profited much by his instructions. His abilities soon recommended him to the king, who frequently made him presents, and at last proposed to send him into Italy under his own patronage, and to take him under his immediate protection as soon as his studies should be com-

pleted. But Handel's parents not thinking proper to submit their child to the caprice of the king, declined the offer; upon which it became necessary for him to return to Hall.

Handel having now obtained ideas in music far excelling every thing that could be found in Hall, continued there very unwillingly, and it was resolved to send him into Italy: but as the expence of this journey could not then be spared, he went to Hamburg, where the opera was little inferior to that of Berlin. Soon after his arrival in this city, his father died; and his mother being left in narrow circumstances, her son thought it necessary to procure some scholars, and to accept a place in the orchestra; by which means, instead of being a burden, he became a great relief to her.

At this time, the first harpsichord in Hamburg was played by one Kefer, a man who also excelled in composition; but he, having involved himself in some debts, was obliged to abscond. Upon this vacancy, the person who had been used to play the second harpsichord claimed the first by right of succession; but was opposed by Handel, who founded a claim to the first harpsichord upon his superior abilities. After much dispute, in which all who supported or directed the opera engaged with much vehemence, it was decided in favour of Handel; but this good success had almost cost him his life. His antagonist resented the supposed affront so much, that, as they were coming out of the orchestra together, he made a push at Handel's breast with a sword, which must undoubtedly have killed him, had there not fortunately been a music-book in the bosom of his coat.

Handel, though yet but in his 15th year, became composer to the house; and the success of *Almeria*, his first opera, was so great, that it ran 30 nights without interruption. Within less than a twelvemonth after this, he set two others, called *Florinda* and *Norene*, which were received with the same applause. During his stay here, which was about four or five years, he also composed a considerable number of sonatas, which are now lost. Here his abilities procured him the acquaintance of many persons of note, particularly the prince of Tuscany, brother to John Galton de Medicis the grand duke. This prince pressed him to go with him to Italy, where he assured him that no convenience should be wanting; but this offer Handel thought proper to decline, being resolved not to give up his independency for any advantage that could be offered him.

In the 19th year of his age, Handel took a journey to Italy on his own bottom; where he was received with the greatest kindness by the prince of Tuscany, and had at all times access to the palace of the grand duke. His serene highness was impatient to have something composed by so great a master; and notwithstanding the difference between the style of the Italian music and the German, to which Handel had hitherto been accustomed, he set an opera called *Roderigo*, which pleased so well, that he was rewarded with 100 sequins and a service of plate. After staying about a year in Florence, he went to Venice, where he is said to have been first discovered at a masquerade. He was playing on a harpsichord in his visor, when Scarlatti, a famous performer, cried out, that the person who played could be none but the famous Saxon, or the devil. But a story similar to this is reported of many eminent persons whose abilities have been discovered in disguise. Here he composed his opera called *Agrippina*, which was performed 27 nights successively, with the most extravagant applause.

From Venice our musician proceeded to Rome, where he became acquainted with cardinal Ottoboni and many other dignitaries of the church, by which means he was frequently attacked on account of his religion; but Handel declared he would live and die in the religion in which he had been educated, whether it was true or false. Here he composed an oratorio called *Resur-*

rections, and 150 cantatas, besides some sonatas, and other music. Ottoboni also contrived to have a trial of skill between him and Dominici Scarlatti, who was considered as the greatest master on the harpsichord in Italy. The event is differently reported. Some say that Scarlatti was victorious, and others give the victory to Handel; but when they came to the organ, Scarlatti himself yielded the superiority to Handel.

From Rome, Handel went to Naples; after which, he paid a second visit to Florence; and at last, having spent six years in Italy, set out for his native country. In his way thither, he was introduced at the court of Hanover with so much advantage by the baron Kilmanseck, that his electoral Highness offered him a pension of 1500 crowns a-year as an inducement for him to continue there. This generous offer he declined on account of his having promised to visit the court of the Elector Palatine, and likewise to come over to England in compliance with the repeated invitations of the duke of Manchester. The elector, however, being made acquainted with this objection, generously ordered him to be told, that his acceptance of the pension should neither restrain him from his promise nor resolution: but that he should be at full liberty to be absent a year or more if he chose it, and to go wherever he thought fit. Soon after, the place of master of the chapel was bestowed upon Handel; and our musician having visited his mother, who was now extremely aged and blind, and his old master Zackaw, and staid some time at the court of the Elector Palatine, set out for England, where he arrived in 1710.

At that time operas were a new entertainment in England, and were conducted in a very absurd manner; but Handel soon put them on a better footing; and set a drama called *Rinaldo*, which was performed with uncommon success. Having staid a year in England, he returned to Hanover; but in 1712 he again came over to England; and the peace of Utrecht being concluded a few months afterwards, he composed a grand *Te Deum* and *Jubilate* on the occasion. He now found the nobility very desirous that he should resume the direction of the opera-house in the Hay Market; and the queen having added her authority to their solicitations, and conferred on him a pension of 200l. a-year, he forgot his engagements to the elector of Hanover, and remained in Britain till the death of the queen in 1714. On the arrival of king George I. Handel, conscious of his ill behaviour, durst not appear at court; but he was extricated from his dilemma by the baron Kilmanseck. Having engaged several of the English nobility in his behalf, the baron persuaded the king to a party of pleasure on the water. Handel was apprised of the design, and ordered to prepare some music for the occasion. This he executed with the utmost attention, and on the day appointed it was performed and conducted by himself. The king with pleasure and surprise inquired whose it was, and how the entertainment came to be provided without his knowledge. The baron then produced the delinquent; and asked leave to present him to his majesty, as one too sensible of his fault to attempt an excuse, but sincerely desirous to atone for it. This intercession was accepted. Handel was restored to favour, his water music was honoured with the highest approbation, and the king added a pension of 200l. a-year to that formerly bestowed on him by queen Anne; which he soon after increased to 400l. on his being appointed to teach the young princes music.

In the year 1715, Handel composed his opera of *Amadige*; but from that time to the year 1720 he composed only *Tiffo* and *Pastor Fido*, Buononcini and Attilio being then composers for the operas. About this time a project was formed by the nobility for erecting a kind of academy at the Hay Market, with a view to secure to themselves a constant supply of operas to be composed by Handel, and performed under his direction.

No less than 50,000*l.* was subscribed for this scheme, of which the king himself subscribed 1000*l.* and it was proposed to continue the undertaking for 14 years. Handel went over to Dresden, in order to engage singers, and returned with Senesino and Durisanti. Buononcini and Attilio had still a strong party in their favour, but not equal to that of Handel; and therefore in 1720 he obtained leave to perform his opera of *Radamisto*. The house was so crowded that many fainted through excessive heat; and 40*s.* were offered by some for a seat in the gallery, after having in vain attempted to get one elsewhere. The contention, however, still ran very high between Handel's party and that of the two Italian masters; and at last it was determined that the rivals should be jointly employed in making an opera, in which each should take a distinct act, and he who by the general suffrage was allowed to have given the best proof of his abilities should be put in possession of the house. This opera was called *Muzio Scaevola*, and Handel set the last act. It is said that Handel's superiority was owned even in the overture before it; but when the act came to be performed, there remained no pretence of doubt or dispute. The academy was now therefore firmly established, and Handel conducted it for nine years with great success; but about that time an irreconcilable enmity took place between Handel himself and Senesino. Senesino accused Handel of tyranny, and Handel accused Senesino of rebellion. The merits of the quarrel are not known: the nobility, however, became mediators for some time; and having failed in that good design, they became parties in the quarrel. Handel was resolved to dismiss Senesino, and the nobility seemed also resolved not to permit him to do so. The haughtiness of Handel's temper would not allow him to yield, and the affair ended in the total dissolution of the academy.

Handel now found that his abilities, great as they were, could not support him against the powerful opposition he met with. After the dismissal of Senesino, his audience sensibly dwindled away, and Handel entered into an agreement with Mr. Heidegger to carry on operas in conjunction with him. New singers were engaged from Italy; but the offended nobility raised a subscription against him, to carry on operas in the play-house in Lincoln's-Inn fields. Handel bore up four years against this opposition; three in partnership with Heidegger, and one by himself: but though his musical abilities were superior to those of his antagonists, the astonishing powers of the voice of Farinelli, whom the opposite party had engaged, determined the victory against him. At last Handel, having spent all he was worth in a fruitless opposition, thought proper to desist. His disappointment had such an effect upon him, that for some time he was disordered in his understanding, and at the same time his right arm was rendered useless by a stroke of the palsy. In this deplorable situation, it was thought necessary that he should go to the baths of Aix-la-Chapelle; and from them he received such extraordinary and sudden relief, that his cure was looked upon by the nuns as miraculous.

In 1736, Handel again returned to England; and soon after his return his *Alexander's Feast* was performed with applause at Covent Garden. The success and splendor of the Hay Market was by this time so much reduced by repeated mismanagements, that lord Middlesex undertook the direction of it himself, and once more applied to Handel for composition. He accordingly composed two operas called *Faramondo*, and *Alessandro Severo*, for which in 1737 he received 1000*l.* In 1738 he received 1500*l.* from a single benefit; and nothing seemed wanting to retrieve his affairs, excepting such concessions on his part as his opponents had a right to expect. These concessions, however, he could not be prevailed upon to make; and that he might no longer be under obligations to act as he was directed by others, he refused to enter into any engagements upon subscription. After having tried a few more operas at Covent Garden without

success, he introduced another species of music called *oratorios*, which he thought better suited to the native gravity of an English audience. But as the subjects of these pieces were always taken from sacred history, it was by some thought to be a profanation to set them to music and perform them at a playhouse. In consequence of this prejudice, the oratorios met with very indifferent success; and in 1741 Mr. Handel found his affairs in such a bad situation, that he was obliged to quit England, and go to Dublin.

He was received in Ireland in a manner suitable to his great merit; and his performing his oratorio called the *Messiah*, for the benefit of the city-prison, brought him into universal favour. In nine months time he had brought his affairs into a better situation; and on his return to England in 1742, he found the public much more favourably disposed. His oratorios were now performed with great applause: his *Messiah*, which before had been but coldly received, became a favourite performance; and Handel, with a generous humanity, determined to perform it annually for the benefit of the Foundling Hospital, which at that time was only supported by private benefactions. In 1743 he had a return of his paralytic disorder; and in 1751 became quite blind by a *gutta serena* in his eyes. This last misfortune for some time sunk him into the deepest despondency; but at last he was obliged to acquiesce in his misfortune, after having without any relief undergone some very painful operations. Finding it now impossible to manage his oratorios alone, he was assisted by Mr. Smith, who at his request frequently played for him, and conducted them in his stead; and with this assistance they were continued till within eight days of his death. During the latter part of his life, his mind was often disordered; yet at times it appears to have resumed its full vigour, and he composed several songs, choruses, &c. which from their dates may be considered almost as the last sounds of his dying voice. From about October 1758 his health declined very fast; his appetite, which had been remarkably keen, and which he had gratified to a great degree, left him; and he became sensible of the approach of death. On the 6th of April 1759, his last oratorio was performed, at which he was present, and he died on the 14th of the same month. On the 20th he was buried by the right reverend Dr. Pearce, bishop of Rochester, in Westminster-abbey; where, by his own order, and at his own expence, a monument was erected to his memory.

With regard to the character of this most eminent musician, he is universally allowed to have been a great epicure: In his temper he was very haughty, but was seldom or never guilty of mean actions. His pride was uniform; he was not by turns a tyrant and a slave. He appears to have had a most extravagant love for liberty and independence; inasmuch, that he would, for the sake of liberty, do things otherwise the most prejudicial to his own interest. He was liberal even when poor, and remembered his former friends when he was rich. His musical powers can perhaps be best expressed by Arbuthnot's reply to Pope, who seriously asked his opinion of him as a musician; "Conceive (said he) the highest you can of his abilities, and they are much beyond any thing you can conceive."

A musical exhibition took place in Westminster-abbey some years ago, under the name of the *Commemoration* of Handel. It may justly be considered the grandest of the kind ever attempted in any nation. Of the rise and progress of the design, together with the manner in which the first celebration was executed, an accurate and amusing detail is given in the 4th volume of the *History of Music*, by Dr. Burney, who closes his observations on this memorable occasion with these words: "As this commemoration is not only the first instance of a band of such magnitude being assembled together, but of any band at all numerous, performing in a similar situation without the assistance of a conductor to regulate the measure, the performances in Westminster-

abbey may be safely pronounced no less remarkable for the multiplicity of voices and instruments employed, than for accuracy and precision. When all the wheels of that huge machine, the orchestra, were in motion, the effect resembled clock-work in every thing but want of feeling and expression. And as the power of gravity and attraction in bodies is proportioned to their mass and density, so it seems as if the magnitude of this band had commanded and impelled adhesion and obedience beyond that of any other of inferior force. The pulsations in every limb, and ramifications of veins and arteries in an animal, could not be more reciprocal, isochronous, and under the regulation of the heart, than the members of this body of musicians under that of the conductor and leader. The totality of sound seemed to proceed from one voice and one instrument; and its powers produced not only new and exquisite sensations in judges and lovers of the art, but were felt by those who never received pleasure from music before. These effects, which will long be remembered by the present public, perhaps to the disadvantage of all other choral performances, run the risk of being doubted by all but those who heard them, and the present description of being pronounced fabulous if it should survive the present generation."

HANG-TCHEOU-FOU, the metropolis of the province of **Tche-kiang** in China. It is, according to the Chinese, the paradise of the earth; and may be considered as one of the richest, best situated, and largest cities of the empire. It is four leagues in circumference, exclusive of its suburbs; and the number of its inhabitants amounts to more than a million. It is computed, that there are a thousand workmen within its walls employed in manufacturing silk. What renders this city delightful, is a small lake, called *Si-bou*, which washes the bottom of its walls on the western side; its water is pure and limpid, and its banks are almost every where covered with flowers. Halls and open galleries, supported by pillars, and paved with large flag stones, have been erected here on piles, for the convenience of those who are fond of walking; causeways, cased with cut stone, traverse the lake in different directions; and the openings which are left in them at intervals, for the passage of boats, are covered by handsome bridges. In the middle of the lake are two islands, to which company generally resort after having amused themselves with rowing, and in which a temple and several pleasure-houses have been built for their reception. The emperor has a small palace in the neighbourhood. This city has a garrison of 3000 Chinese under the command of the viceroy, and 3000 Tartars commanded by a general of the same nation. It has under its jurisdiction seven cities of the second and third class.

HANGING, a common name given to the method of inflicting death on criminals by suspending them by the neck. Physicians are not agreed as to the manner in which death is brought on by hanging. De Haen hanged three dogs, whom he afterwards opened. In one, nothing remarkable appeared in the lungs. In another, from whom half an ounce of blood was taken from the jugular vein, the dura and pia mater were of the natural appearance; but the lungs were much inflamed. In the third, the meninges were found, and there was no effusion of blood in the ventricles of the brain, but the left lobe of the lungs was turgid with blood. Wepfer, Littræus, Alberti, Bruhierius, and Boerhaave, affirm that hanged animals die apoplectic. Their arguments for this are chiefly drawn from the livid colour of the face; from the turgescency of the vessels of the brain; the inflammation of the eyes; and from the sparks of fire which those who have survived hanging allege they have seen before their eyes. On the contrary, Bonetus, Petit, Haller, and Laucisi, from observing that death is occasioned by any small body falling into the glottis, have ascribed it to the stoppage of respiration. Others, deeming both these causes ill-founded, have ascribed it to a *luxation* of the *vertebræ* of the neck, which,

however, it is well known, scarcely ever takes place. De Haen adduces the authority of many eminent authors to prove the possibility of recovering hanged persons; and observes, in general, that with bleeding in the jugular vein, and anointing the neck with warm oil, the same remedies are to be employed in this case as for the recovery of drowned people. See **DROWNING**.

HANGINGS, denote any kind of drapery hung up against the walls or wainscoting of a room. See *PAPER-Hangings*, *TAPESTRY*, &c.

HANGCLIFF, a remarkable point of land on the east coast of the largest of the Shetland Islands. It is frequently the first land seen by ships in northern voyages. Captain Phipps determined its situation to be in W. lon. $0^{\circ} 56' 30''$. N. lat. $60^{\circ} 9'$.

HANNIBAL, a famous Carthaginian general, of whose exploits an account is given in the histories of **CARTHAGE** and **ROME**. After having had the misfortune to lose a sea-fight with the Rhodians, through the cowardice of Apollonius one of the admirals of Antiochus the Great, he was forced to fly into Crete, to avoid falling into the hands of the Romans. On his arrival in this island, he took sanctuary among the Gortynii; but as he had brought great treasure along with him, and knew the avarice of the Cretans, he thought proper to secure his riches by the following stratagem. He filled several vessels with melted lead, just covering them over with gold and silver. These he deposited in the temple of Diana, in the presence of the Gortynii, with whom, he said, he trusted all his treasure: Justin tells us, that he left this with them as a security for his good behaviour, and lived for some time very quietly in these parts. He took care, however, to conceal his riches in hollow statues of brass; which, according to some, he always carried along with him; or, as others will have it, exposed in a public place as things of little value. At last he retired to the court of Prusias king of Bithynia, where he found means to unite several of the neighbouring states with that prince into a confederacy against Eumenes king of Pergamus, a professed friend to the Romans; and during the ensuing war gave Eumenes several defeats, more through the force of his own genius than the valour of his troops. The Romans having received intelligence of the important services performed by Hannibal, immediately dispatched T. Quintius Flaminius as an ambassador to Prusias, in order to procure his destruction. At his first audience, he complained of the protection given to that famous general, representing him "as the most inveterate and implacable enemy the Romans ever had; as one who had ruined both his own country and Antiochus, by drawing them into a destructive war with Rome." Prusias, in order to ingratiate himself with the Romans, immediately sent a party of soldiers to surround Hannibal's house, that he might find it impossible to make his escape. The Carthaginian, having before discovered that no confidence was to be reposed in Prusias, had contrived seven secret passages from his house, in order to evade the machinations of his enemies, even if they should carry their point at the Bithynian court. But guards being posted at these, he could not fly, though, according to Livy, he attempted it. Perceiving, therefore, no possibility of escaping, he had recourse to poison, which he had long reserved for such a melancholy occasion. Then taking it in his hand, "Let us (said he) deliver the Romans from the disquietude with which they have long been tortured, since they have not patience to wait for an old man's death. Flaminius will not acquire any reputation or glory by a victory gained over a betrayed and defenceless person. This single day will be a lasting testimony of the degeneracy of the Romans. Their ancestors gave Pyrrhus intelligence of a design to poison him, that he might guard against the impending danger, even when he was at the head of a powerful army in

Italy; but they have deputed a person of consular dignity to excite Prusias impiously to murder one who has taken refuge in his dominions, in violation of the laws of hospitality." Then having denounced dreadful imprecations against Prusias, he drank the poison, and expired at the age of 70 years. Cornelius Nepos acquaints us, that he put an end to his life by a subtle poison which he carried about with him in a ring. Plutarch relates, that, according to some writers, he ordered a servant to strangle him with a cloak wrapped about his neck; and others say, that, in imitation of Midas and Themistocles, he drank bull's blood.

With respect to the character of this general, it appears to have been in military affairs what Demosthenes was in oratory, or Newton in mathematics; namely, absolutely perfect, in which no human wisdom could discover a fault, and to which no man could add a perfection. Rollin hath contrasted his character with that of Scipio Africanus. He enumerates the qualities which make a complete general; and having then given a summary of what historians have related concerning both commanders, is inclined to give the preference to Hannibal. "There are, however (he says), two difficulties which hinder him from deciding; one drawn from the characters of the generals whom Hannibal vanquished; the other from the errors he committed. May it not be said (continues our author), that those victories which made Hannibal so famous, were as much owing to the imprudence and temerity of the Roman generals, as to his bravery and skill? When a Fabius and a Scipio were sent against him, the first stopped his progress, the other conquered him." These reasons however were answered by Mr. Hooke, who has taken some pains to vindicate Hannibal's character, by fully and fairly comparing it with that of Scipio Africanus, and other Roman commanders.

HANNO, general of the Carthaginians, was commanded to sail round Africa. He entered the ocean through the Straits of Gibraltar, and discovered several countries. He would have continued his navigation, had it not been for want of provisions. He wrote an account of his voyage, which was often quoted, but not much credited. Sigismund Gelenius published it in Greek at Basil, by Frobenius, in 1533. He lived, according to Pliny, when the affairs of the Carthaginians were in the most flourishing condition; but this is a very indeterminate expression.

HANOVER, a town of Germany, capital of the king of Great Britain's German dominions. The electors resided here before George I. ascended the British throne. The regency is administered in the same manner as if the sovereign were present. It is a large well-built town, and well fortified. The established religion is the Lutheran; but the Roman Catholics are tolerated, and have a handsome church. It has suffered greatly by the French, who got possession of it in 1757; but they were soon after expelled. Hanover is noted for a particular sort of beer, reckoned excellent by the people of this electorate. It is seated on the river Leina, which divides it in two; 25 miles W. of Brunswick. E. lon. 10. 5. N. lat. 52. 25.

HANOVER, an electorate of Germany, which comprehended, at first, nothing but the county of Lawenbroad; but now it contains the duchy of Zell, Saxe-Lawenburg, Bremen, Lunenburg, the principality of Verden, Crubenhagen, and Oberwald. George I. king of Great Britain, was the first that gained possession of all these states, which lie mostly between the rivers Weser and Elbe, and extend 200 miles in length from S. W.; but the breadth is different, being in some places 150 miles, and in others but 50. Their produce is timber, cattle, hogs, mum, beer, and bacon; a little silver, copper, lead, iron, vitriol, brimstone, quicksilver, and copperas.

HANOVER, a fine large island, opposite the N. W. extremity of New Ireland. It is high, and covered with trees, among

which are many plantations, presenting a very beautiful appearance; and still further westward, in lon. 147° E. lie the Admiralty Islands, between 20 and 30 in number, many of them of considerable extent.

HANSE. or HANS, an ancient name for a society or company of merchants; particularly that of certain cities in Germany, &c. hence called *Hanse towns*. The word *hanse* is obsolete High Dutch or Teutonic; and signifies "alliance, confederacy, association," &c. Some derive it from the two German words, *am-see*, that is, "on the sea;" by reason the first hanse towns were all situated on the sea-coast: whence the society is said to have been first called *am see steden*, that is, "cities on the sea;" and afterwards, by abbreviation, *hansee*, and *hanse*.

HANSE-TOWNS. The hanseatic society was a league between several maritime cities of Germany, for the mutual protection of their commerce. Bremen and Amsterdam were the two first that formed it; whose trade received such advantage by their fitting out two men of war in each to convoy their ships, that more cities continually entered into the league: even kings and princes made treaties with them, and were often glad of their assistance and protection; by which means they grew so powerful both by sea and land, that they raised armies as well as navies, enjoyed countries in sovereignty, and made peace or war, though always in defence of their trade, as if they had been an united state or commonwealth.

At this time also abundance of cities, though they had no great interest in trade, or intercourse with the ocean, came into their alliance for the preservation of their liberties: so that in the year 1200 we find no less than 72 cities in the list of the towns of the Hanse; particularly Bremen, Amsterdam, Antwerp, Rotterdam, Dort, Bruges, Ostend, Dunkirk, Middleburgh, Calais, Rouen, Rochelle, Bourdeaux, St. Malo, Bayonne, Bilboa, Lisbon, Seville, Cadiz, Carthage, Barcelona, Marseilles, Leghorn, Naples, Messina, London, Lubec, Rostock, Stralsund, Stetin, Wismar, Königsberg, Dantzic, Elbing, Marienburg.

The alliance was now so powerful, that their ships of war were often hired by other princes to assist them against their enemies. They not only awed, but often defeated, all that opposed their commerce; and, particularly in 1258, they took such revenge of the Danish fleet in the Sound, for having interrupted their commerce, that Waldemar III. then king of Denmark, for the sake of peace, gave them up all Schonen for 16 years; by which they commanded the passage of the Sound in their own right.—In 1428 they made war on Erick king of Denmark with 250 sail, carrying on board 12,000 men. These so ravaged the coast of Jutland, that the king was glad to make peace with them.

Many privileges were bestowed upon the hanse towns by Louis XI. Charles VIII. Louis XII. and Francis I. kings of France; as well as by the emperor Charles V. who had divers loans of money from them; and by king Henry III. who also incorporated them into a trading body, in acknowledgment for money which they advanced to him, as well as for the good services they did him by their naval forces in 1206.

These towns exercised a jurisdiction among themselves; for which purpose they were divided into four colleges or provinces, distinguished by the names of their four principal cities, viz. Lubec, Cologne, Brunswick, and Dantzic, wherein were held their courts of judicature. They had a common stock or treasury at Lubec, and power to call an assembly as often as necessary. They kept magazines or warehouses for the sale of their merchandises in London, Bruges, Antwerp, Berg in Norway, Revel in Livonia, Novogorod in Muscovy, which were exported to most parts of Europe, in English, Dutch, and Flemish bottoms. One of their principal magazines was at London, where

a society of German merchants was formed, called the *steelyard company*. To this company great privileges were granted by Edward I. but revoked by act of parliament in 1552, in the reign of Edward VI. on a complaint of the English merchants that this company had so engrossed the cloth-trade, that in the preceding year they had exported 50,000 pieces, while all the English together had shipped off but 1100. Queen Mary, who ascended the throne the year following, having resolved to marry Philip the emperor's son, suspended the execution of the act for three years; but after that term, whether by reason of some new statute, or in pursuance of that of king Edward, the privileges of that company were no longer regarded, and all efforts of the hanse-towns to recover this loss were in vain.

Another accident that happened to their mortification was while queen Elizabeth was at war with the Spaniards. Sir Francis Drake happening to meet 60 ships in the Tagus, laden with corn, belonging to the hanse-towns, took out all the corn as contraband goods which they were forbid to carry by their original patent. The hanse-towns having complained of this to the diet of the empire, the queen sent an ambassador thither to declare her reasons. The king of Poland likewise interested himself in the affair, because the city of Dantzic was under his protection. At last, though the queen strove hard to preserve the commerce of the English in Germany, the emperor excluded the English company of merchant-adventurers, who had considerable factories at Stade, Embden, Bremen, Hamburg, and Elbing, from all trade in the empire. In short, the hanse-towns, in Germany in particular, were not only in so flourishing, but in so formidable a state, from the 14th to the 16th centuries, that they gave umbrage to all the neighbouring princes, who threatened a strong confederacy against them; and, as the first step towards it, commanded all the cities within their dominion or jurisdiction to withdraw from the union or hanse, and be no farther concerned therein. This immediately separated all the cities of England, France, and Italy, from them. The hanse, on the other hand, prudently put themselves under the protection of the empire: and as the cities just now mentioned had withdrawn from them; so they withdrew from several more, and made a decree among themselves, that none should be admitted into their society but such as stood within the limits of the German empire, or were dependent thereon; except Dantzic, which continued a member, though in nowise dependent on the empire, only it had been summoned formerly to the imperial diet. By this means they maintained their confederacy for the protection of their trade, as it was begun, without being any more envied by their neighbours. Hereby likewise they were reduced to Lubec, Bremen, Hamburg, and Dantzic; in the first of which they kept their register, and held assemblies once in three years at least. But this hanse or union has for some time been dissolved; and now every one of the cities carries on a trade separately for itself, according to the stipulation in such treaties of peace, &c. as are made for the empire betwixt the emperor and other potentates.

HANUYE, a town of Austrian Brabant, 20 miles S. E. of Louvain. E. lon. 5. 16. N. lat. 50. 41.

HANWAY (Jonas), eminent for his benevolent designs and useful writings, was born at Portsmouth in Hampshire on the 12th of August 1712. His father, Mr. Thomas Hanway, was an officer in the naval service, and for some years store-keeper to the dock-yard at that place. He was deprived of his life by an accident; and left his widow with four children, Jonas, William, Thomas, and Elizabeth, all of a very tender age. Mrs. Hanway, coming to London after the death of her husband, put Jonas to school, where he learned writing and accounts, and made some proficiency in Latin. At the age of 17 he was sent to Lisbon, where he arrived in June 1729, and was bound ap-

prentice to a merchant in that city. His early life, we are informed, was marked with that discreet attention to business, and love of neatness and regularity, which afterwards distinguished his character. At Lisbon his affections were captivated by a lady, then celebrated for her beauty and mental accomplishments; but she, preferring another for her husband, returned to England, and spent the latter part of her life in London with her family, on terms of friendship with Mr. Hanway. On the expiration of Mr. Hanway's apprenticeship, he entered into business at Lisbon as a merchant or factor; but did not remain there long before he returned to London.

He soon after connected himself as a partner in Mr. Dingley's house in St. Petersburg; where he arrived on the 10th of June 1743. The trade of the English nation over the Caspian Sea into Persia at this period had been entrusted to the care of Mr. Elton, who, not content with the pursuit of commercial affairs, had injudiciously engaged in the service of Nadir Shah to build ships on the Caspian after the European manner. This had alarmed the merchants in the Russian trade, and a resolution was formed that one of their body should make a journey into Persia. On this occasion Mr. Hanway offered his service, and was accepted. He set out on the 10th of September; and after experiencing a variety of hazards in that kingdom during a course of 12 months, returned to St. Petersburg, January 1, 1745, without being able to establish the intended trade by the Caspian, partly through the jealousy of the Russian court on account of Elton's connections with the Persians, and partly by the troubles and revolutions of the latter kingdom.

Though Mr. Hanway's conduct during this expedition seems to have been directed by the strictest rules of integrity, yet some difficulties arose in settling his demands on his employers. These, however, in the end were referred to the determination of impartial arbitrators, who at length decided in his favour. "I obtained (he says) my own; and as to any other personal advantage, it consisted in exercising my mind in patience under trials, and increasing my knowledge of the world." He now settled at St. Petersburg; where he remained five years, with no other variations in his life than such as may be supposed to occur in the dull round of a mercantile employment. During this time he interested himself greatly in the concerns of the merchants who had engaged in the Caspian trade: but the independence he had acquired having excited a desire to see his native country, he, after several disappointments which prevented him from accomplishing his wish, left St. Petersburg on the 9th of July 1750. On his arrival in his native country, he did not immediately relinquish his mercantile connections, though he seems to have left Russia with that view. He employed himself some time as a merchant; but afterwards, more beneficially to the world, as a private gentleman. In 1753 he published "An Historical Account of the British Trade over the Caspian Sea; with a Journal of Travels from London through Russia into Persia; and back again through Russia, Germany, and Holland. To which are added, the Revolutions of Persia during the present Century, with the particular History of the great Ufurper Nadir Kouli," 4 vols. 4to: a work which was received, as it deserved to be, with great attention from the public. In 1754 we find Mr. Hanway commending a plan offered for the advantage of Westminster, and suggesting hints for the further improvement of it, in "A Letter to Mr. John Spranger, on his excellent Proposal for Paving, Cleansing, and Lighting the Streets of Westminster, &c." 8vo. A few years afterwards, when a scheme of the like kind was carried into effect, many of Mr. Hanway's ideas, thrown out in this pamphlet, were adopted. In 1756, he printed "A Journal of Eight Days Journey from Portsmouth to Kingston upon Thames, with an Essay on Tea;" which was afterwards reprinted in 2 vols. 8vo, 1757.

At this juncture, Great Britain being on the eve of a war with France, the event of which was very important to the nation at large, and required every effort of patriotism and prudence to ward off the impending danger, Mr. Hanway published "Thoughts on the Duty of a good Citizen with regard to War and Invasion, in a Letter from a Citizen to his Friend," 8vo. About the same time, several gentlemen formed a plan, which was matured and made perfect by the assiduity of Mr. Hanway, for providing the navy with sailors, by furnishing poor children with necessaries to equip them for the service of their country. The success and propriety of this scheme soon became apparent. Mr. Hanway wrote and published three pamphlets on this occasion; and the treasurer of the Society, accompanied by Mr. Hanway, having waited on the king, the Society received 1000l. from his majesty, 400l. from the Prince of Wales, and 200l. from the Princess Dowager. This excellent institution through life was the favourite object of Mr. Hanway's care, and it continued to flourish under his auspices greatly to the advantage of the community. In 1758 he became an advocate for another charitable institution, which derived considerable emolument from his patronage of it. This was the Magdalen Charity; and, to assist it, he published "A Letter to Robert Dingley, Esq. being a Proposal for the Relief and Employment of Friendless Girls and Repenting Prostitutes," 4to. He also printed other small performances on the same subject.

In 1759 Mr. Hanway wrote "Reasons for an Augmentation of at least Twelve Thousand Mariners, to be employed in the Merchants Service and Coasting Trade, in 33 Letters to Charles Gray, Esq. of Colchester," 4to. The next year he published several performances: viz. 1. "A candid historical Account of the Hospital for the Reception of exposed and deserted young Children; representing the present Plan of it as productive of many Evils, and not adapted to the Genius and Happiness of this Nation," 8vo; which being answered by an anonymous Letter from Halifax in "Candid Remarks, 8vo. 1760," Mr. Hanway replied to it, and the Remarker rejoined. 2. "An Account of the Society for the Encouragement of the British Troops in Germany and North America, &c." 8vo. 3. "Eight Letters to — Duke of —, on the Custom of Vails-giving in England," 8vo. This practice of giving vails had arrived at a very extravagant pitch, especially among the servants of the great. It was Mr. Hanway who answered the kind reproach of a friend in a high station for not coming oftener to dine with him, by saying, "Indeed I cannot afford it." The nobleman to whom the above letters were addressed was the duke of Newcastle. The letters are written in that humorous style which is most attractive of general notice, and was best adapted to the subject. It was Sir Timothy Waldo that first put Mr. Hanway on this plan. Sir Timothy had dined with the duke of N——, and, on his leaving the house, was contributing to the support and insolence of a train of servants who lined the hall; and at last put a crown into the hand of the cook, who returned it, saying, "Sir, I do not take silver."—"Don't you indeed?" said the worthy baronet, putting it in his pocket; "then I do not give gold." Among the ludicrous circumstances in Mr. Hanway's letters is one which happened to himself. He was paying the servants of a respectable friend for a dinner which their master had invited him to, one by one as they appeared; "Sir, your great-coat;" a shilling—"Your hat;" a shilling—"Stick;" a shilling—"Umbrella;" a shilling—"Sir, your gloves;" "Why, friend, you may keep the gloves; they are not worth a shilling." In 1761, Mr. Hanway produced "Reflections, Essays, and Meditations on Life and Religion; with a Collection of Proverbs, and 28 Letters written occasionally on several Subjects," in 2 vols. 8vo.

The many useful and public-spirited plans which Mr. Han-

way had promoted for the welfare of the community, had now rendered his character most respectably popular, while his disinterestedness, and the sincerity of his intentions, were conspicuous to all. Five citizens of London, of whom the late Mr. Hoare the banker was one, waited on lord Bute, at that time the minister; and, in their own names, and the names of their fellow-citizens, requested that some notice might be taken of a man, who, at the expence of his own private fortune, and unremitting application, had rendered so many and such meritorious services to his country. In consequence of this request, he was in July 1762 appointed by a patent one of the commissioners for victualling the navy; a post which he held above 21 years. The next act of public beneficence in which we find him engaged is the collection of money for the sufferers by the fire which happened at Montreal, in the province of Quebec, in May 1765, when a fourth part of the city was consumed. On this occasion Mr. Hanway, in conjunction with two other gentlemen, collected 8415l. The very next year a dreadful fire broke out in Bridge Town in Barbadoes, which consumed buildings and property to the amount of near 100,000l. A subscription was opened, in which Mr. Hanway was a principal actor, and 14,886l. were collected, and transmitted to a committee appointed at Barbadoes to distribute it to the unfortunate sufferers. At subsequent periods he continued to interest himself in various other plans for relieving the distressed, and promoting the good, of different classes of the community. His attention was particularly directed towards alleviating the miseries of young chimney-sweepers. Besides the distressed of these helpless beings, which are open to general observation, such as a contortion of the limbs, and the prevention of their growth, they are liable to a disease peculiar to their occupation, now known by the name of the *chimney-sweeper's cancer*. Four children have been brought together into a workhouse, all afflicted with this dreadful and incurable disease. After much inquiry and consideration, he published, in 1773, "The State of the Chimney-sweepers young Apprentices; showing the wretched Condition of these distressed Boys; the ill Conduct of such Masters as do not observe the Obligation of Indentures; the Necessity of a strict Inquiry in order to support the civil and religious Rights of these Apprentices," 12mo. This small pamphlet has already been productive of some advantage to the objects intended to be benefited by it. The succeeding year, 1774, he enlarged a former publication, entitled "Advice from a Farmer to his Daughter, &c." and republished it under the title of "Virtue in humble Life; containing Reflections on the reciprocal Duties of the Wealthy and Indigent, the Master and the Servant," 2 vols. 8vo. a work deserving the particular consideration of every magistrate. This edition in a few months being sold, he reprinted it in two quarto volumes, with a dedication to Mrs. Montague.

In 1783, finding his health decline, he determined to resign his office at the victualling board, which he did on the 2d of October that year; and immediately received a grant of his whole salary by way of a pension, to continue for life. This favour he owed to the esteem which his majesty, to whom he was personally known, entertained of him; excited by his various exertions in behalf of his country and mankind. He was now released from his most material business, but did not think it would conduce to his happiness to lead an idle life. He engaged again in behalf of the chimney-sweepers boys; and promoted, by every means in his power, the establishment of Sunday-schools, which are now indeed very generally adopted in every county in England. He likewise promoted a subscription for the relief of the many black poor people who wandered about the metropolis in extreme distress; and the lords of the treasury seconded the design, by directing money, as far as 14l. a-head, to be issued to the committee, to enable them to send the blacks to such places abroad as might be fixed on. After encounter-

ing many obstacles, about 300 negroes were sent, properly accommodated with provisions and necessaries, to Africa, under the conduct of a person approved for that station. The object of this plan, besides relieving the misery of these poor people, was to prevent in time the unbecomly connections between black persons and white, the evident consequences of which make their appearance frequently in our streets.

In the summer of 1786, Mr. Hanway's health declined so visibly that he thought it necessary to attend only to that. As he was extremely susceptible of cold, he took various precautions to defend himself from the effects of bad weather; and, among other expedients, was the first who ventured to carry an umbrella in the streets of London; a practice which has since become so universal.

With regard to his various publications, although they were defective in point of arrangement and abounding in digressions, yet those who are judges of literary composition allow, that his language is well calculated to have the effect he desired on the reader, and to impress him with the idea that the author was a man of inflexible integrity, and wrote from the pure dictates of the heart. It is plain and unornamented, without the appearance of art, or the affectation of singularity. Its greatest defect (say they) is a want of conciseness; its greatest beauty, an unaffected and genuine simplicity. He spoke French and Portuguese, and understood the Rus and modern Persic imperfectly. Latin he had been taught at school, but had not much occasion to cultivate it after he entered into life.

Mr. Hanway, although never married himself, was yet an advocate for marriage, and recommended it to all young people as the most effectual restraint on licentiousness. In his transactions with the world, he was always open, candid, and sincere. Whatever he said might be depended on with implicit confidence. In his department of commissioner for victualling the navy he was uncommonly assiduous and attentive; and kept the contractors and persons who had dealings with the office at a great distance. He would not even accept a hare or pheasant, or the smallest present, from any of them, but, with some mild answer, had them returned to the donors.

Besides the works already mentioned in the course of this article, Mr. Hanway was the author of a great number of others; his different publications amounting all together to between sixty and seventy. A complete list of them is given by his biographer Mr. Pugh, from whose grateful and well-written performance this article has been chiefly extracted.

HAP, or HAPP, in law, signifies to catch or snatch a thing. Thus we meet with, to hap the possession of a deed-poll. Littleton, fol. 8. also, to hap the rent. If partition be made between two parceners, and more land be allowed the one than the other, she that hath most of the land charges it to the other, and happeth the rent whereon assize is brought.

HAPAE, the name of four of the Friendly Islands in the S. Pacific Ocean. They are of a similar height and appearance, and connected by a reef of coral rocks, dry at low water. The plantations are very numerous and extensive; and some of them are inclosed in such a manner, that the fences, running parallel to each other, form spacious public roads, that would appear ornamental in countries, where rural conveniences have been carried to the greatest perfection. These islands extend about 19 miles. See FRIENDLY ISLANDS.

HAPSAI, a sea-port of the government of Revel, or Esthonia, in the Russian empire. It is seated on the Baltic, five miles S. W. of Revel, opposite the island of Dago. E. lon. 22. 47. N. lat. 59. 4.

HAPSBURG, an ancient castle, now in ruins, on a lofty eminence, near the town of Schintznach, not far from the river Aar, in the canton of Berne in Switzerland. This place was the cradle, as it were, of the house of Austria, whose an-

cestors may be traced back to the beginning of the 13th century, when they were no more than simple barons of Switzerland; and this castle commands an unbounded view over hills and dales, plains and forests, rivers and lakes, towns and villages, mountains and alps, emblems of that extent of power to which the talents of one man, who derived his title from this castle (Rodolph count of Hapsburg) raised himself and his descendants. What is left of this castle is now inhabited by the family of a peasant. There is another castle of the same name, near the lake of Lucern, which some authors have erroneously asserted to be that from which the counts derived their title. See GER-MANY.

HAQUE, in our old writers, a little hand-gun, prohibited to be used for destruction of game, &c. by statute 33 Hen. VIII. cap. 6. and 2 & 3 Ed. VI. cap. 14. There is also the half-haque, or demi-haque, within the said acts.

HARAM. See SERAGLIO.

HARANGUE, a modern French name for a speech or oration made by an orator in public. Menage derives the word from the Italian *aranga*, which signifies the same; formed, according to Ferrari, from *arringo*, "a just, or place of justing." Others derive it from the Latin *ara*, "altar;" by reason the first harangues were made before altars: whence the verse of Juvenal, "*Aut Lugdunensis rhetor dicturus ad aram.*" Harangues were usually made by the generals previous to an engagement both amongst the Greeks and Romans. An harangue on such occasions was called *allocutio*. See ALLOCUTIO. The word is also frequently used in a ludicrous sense, viz. for a too pompous, prolix, or unseasonable speech or declamation.

HARBINGER, an officer of the king's household, having four yeomen under him, who ride a day's journey before the court when it travels, to provide lodgings, &c.

HARBOROUGH, (MARKET), a town of Leicestershire, with a market on Tuesday. It is seated on the river Welland, which separates it from Northamptonshire, and is 14 miles S. of Leicester, and 83 N. by W. of London. W. lon. 0. 52. N. lat. 52. 28.

HARBOUR, a general name given to any sea-port or haven; as also to any place convenient for mooring shipping, although at a great distance from the sea. The qualities requisite in a good harbour are, that the bottom be entirely free from rocks or shallows; that the opening be of sufficient extent to admit the entrance or departure of large ships without difficulty; that it should have good anchoring-ground, and be easy of access; that it should be well defended from the violence of the wind and sea; that it should have room and convenience to receive the shipping of different nations, and those which are laden with different merchandises; that it be furnished with a good light-house, and have variety of proper rings, posts, moorings, &c. in order to remove or secure the vessels contained therein; and, finally, that it have plenty of wood, and other materials for firing, besides hemp, iron, mariners, &c.

HARBURG, a town of Germany, in the duchy of Lunenburg, with a strong castle, seated on the Elbe, opposite Hamburg, 37 miles N. W. of Lunenburg.

HARCOURT, a town of France, in the department of Calvados and late province of Normandy. Hence a late noble family in France derived their ducal title; and hence originally came the noble family of the same name in England. It is 12 miles S. of Caen.

HARDENING, the giving a greater degree of hardness to bodies than they had before. There are several ways of hardening iron and steel, as by hammering them, quenching them in cold water, &c. See STEEL.

Case-HARDENING. See CASE-HARDENING.

HARDERWICK, a town of the United Provinces, in Guelderland, with a university. It is seated on the Zui-

der-zee, 32 miles E. of Amsterdam. E. lon. 5. 40. N. lat. 52. 23.

HARDNESS, in bodies, a property directly opposite to fluidity; by which they resist the impression of any other substance, sometimes in an extreme degree. As fluidity has been found to consist in the motion of the particles of a body upon one another in consequence of a certain action of the universal fluid or elementary fire among them; we must conclude that hardness consists in the absence of this action, or a deficiency of what is called *latent heat*. This is confirmed by observing, that there is an intermediate state betwixt hardness and fluidity, in which bodies will yield to a certain force, though they still make a considerable resistance. This is principally observed in the metals, and is the foundation of their ductility. It appears, indeed, that this last property, as well as fluidity, is entirely dependent on a certain quantity of latent heat absorbed, or otherwise acting within the substance itself; for all the metals are rendered hard by hammering, and soft by being put again into the fire and kept there for some time. The former operation renders them hot as well as hard; probably, as Dr. Black observes, because the particles of metal are thus forced nearer one another, and those of fire squeezed out from among them. By keeping them for some time in the fire, that element insinuates itself again among the particles, and arranges them in the same manner as before, so that the ductility returns. By a second hammering this property is again destroyed, returning on a repetition of the heating, or *annealing* as it is called; and so on, as often as we please.

Hardness appears to diminish the cohesion of bodies in some degree, though their fragility does not by any means keep pace with their hardness. Thus, glass is very hard and very brittle; but flint, though still harder than glass, is much less brittle. Among the metals, however, these two properties seem to be more connected, though even here the connection is by no means complete. Steel, the hardest of all the metals, is indeed the most brittle; but lead, the softest, is not the most ductile. Neither is hardness connected with the specific gravity of bodies; for a diamond, the hardest substance in nature, is little more than half the weight of the lightest metal. As little is it connected with the coldness, electrical properties, or any other quality with which we are acquainted: so that though the principle above laid down may be accepted as a general foundation for our inquiries, a great number of particulars remain yet to be discovered before we can offer any satisfactory explanation.

All bodies become harder by cold; but this is not the only means of their doing so, for some become hard by heat as well as cold. Thus, water becomes hard by cold when it is frozen, but it becomes much harder when its steam is passed over red-hot iron, and it enters the substance of the metal, by an union with which it becomes almost as hard as glass.

Mr. Quist and others have constructed tables of the hardness of different substances. The method pursued in constructing these tables was by observing the order in which they were able to cut or make any impression upon one another. The following table, extracted from M. Magellan's edition of Cronstedt's Mineralogy, was taken from Dr. Quist, Bergman, and Mr. Kirman. The first column shows the hardness, and the second the specific gravity.

Diamond from Ormus	-	20	—	3.7
Pink diamond	-	19	—	3.4
Blueish diamond	-	19	—	3.3
Yellowish diamond	-	19	—	3.3
Cubic diamond	-	18	—	3.2
Ruby	-	17	—	4.2
Pale ruby from Brazil	-	16	—	3.5
Ruby spinell	-	13	—	3.4

Deep blue sapphire	-	-	16	—	3.8
Ditto paler	-	-	17	—	3.8
Topaz	-	-	15	—	4.2
Whitish ditto	-	-	14	—	3.5
Bohemian ditto	-	-	11	—	2.8
Emerald	-	-	12	—	2.8
Garnet	-	-	12	—	4.4
Agate	-	-	12	—	2.6
Onyx	-	-	12	—	2.6
Sardonyx	-	-	12	—	2.6
Occid. amethyst	-	-	11	—	2.7
Crystal	-	-	11	—	2.6
Carnelian	-	-	11	—	2.7
Green jasper	-	-	11	—	2.7
Reddish yellow ditto	-	-	9	—	2.6
Schoerl	-	-	10	—	3.6
Tourmaline	-	-	10	—	3.0
Quartz	-	-	10	—	2.7
Opal	-	-	10	—	2.6
Chrysolite	-	-	10	—	3.7
Zeolyte	-	-	8	—	2.1
Fluor	-	-	7	—	3.5
Calcareous spar	-	-	6	—	2.7
Gypsum	-	-	5	—	2.3
Chalk	-	-	3	—	2.7

HARDOUIN (John), a learned French Jesuit in the beginning of the 18th century, known by the remarkable paradoxes he advanced in his writings; this in particular, That all the works of the ancient profane writers, except Cicero's works, Virgil's Georgics, Horace's satires and epistles, and Pliny's natural history, are mere forgeries. He died at Paris in 1729, aged 83. His principal works are, 1. An edition of Pliny's natural history, with notes, which is much esteemed. 2. An edition of the Councils, which made much noise. 3. Chronology restored by medals, 4to. 4. A commentary on the New Testament, folio; in which he pretends that our Saviour and his apostles preached in Latin, &c.

HARE, in zoology. See **LEPUS**. The hare is a beast of venery, or of the forest, but peculiarly so termed in the second year of her age. There are reckoned four sorts of them, from the place of their abode: some live in the mountains, some in the fields, some in marshes, and some wander about every where. The mountain-hares are the swiftest, the field-hares are not so nimble, and those of the marshes are the slowest: but the wandering hares are the most dangerous to follow; for they are cunning in the ways and mazes of the fields, and, knowing the nearest ways, run up the hills and rocks, to the confusion of the dogs, and the discouragement of the hunters. See the article **HUNTING**.

Hares and rabbits are very mischievous to new planted orchards, by peeling off the barks of the tender and young trees for their food. They do also the same sort of mischief to nurseries; for the prevention of which, some bind ropes about the trees up to such a height as they are able to reach: some daub them with tar; but though this keeps off the hares, it is itself mischievous to the trees; but this hurtful property of it is in some degree taken off by mixing any kind of fat or grease with it, and incorporating them well over the fire. This mixture is to be rubbed over the lower part of the trees in November, and will preserve them till that time the next year, without any danger from these animals. It is only in the hard weather in the winter season, when other food is scarce, that these creatures feed on the barks of trees.

People who have the care of warrens, pretend to an odd way of making hares fat when they get them there. This is the stopping up their ears with wax, and rendering them deaf. The

hare is so timorous a creature, that she is continually listening after every noise, and will run a long way on the least suspicion of danger: so that she always eats in terror, and runs herself out of flesh continually. These are both prevented by her feeding in a safe place, and that without apprehension; and they say she will always readily be fattened in this way.

Jaco HARE. See *Mus.*

HARE's Ear, in botany. See *RUPULEURUM*.

HARE (Dr. Francis), an English bishop, of whose birth we have no particulars, was bred at Eton school, and from that foundation became a member of King's-college, Cambridge; where he had the tuition of the marquis of Blandford, only son of the illustrious duke of Marlborough, who appointed him chaplain-general to the army. He afterwards obtained the deanery of Worcester, and from thence was promoted to the bishopric of Chichester, which he held with the deanery of St. Paul's to his death, which happened in 1740. He was dismissed from being chaplain to George I. in 1718, by the strength of party prejudices, in company with Dr. Mols and Dr. Sherlock, persons of distinguished rank for parts and learning. About the latter end of queen Anne's reign he published a remarkable pamphlet, intitled, *The Difficulties and Discouragements which attend the Study of the Scriptures*, in the Way of private Judgment: in order to shew, that since such a study of the Scriptures is an indispensable duty, it concerns all Christian societies to remove, as much as possible, those discouragements. In this work, his manner appeared to be so ludicrous, that the Convocation fell upon him, as if he were really against the study of the holy scriptures: and Whiston says, that finding this piece likely to hinder that preferment he was seeking for, he aimed to conceal his being the author. He published many pieces against bishop Hoadley, in the Bangorian Controversy, as it is called; and also other learned works, which were collected after his death, and published in four vols. 8vo. 2. An edition of Terence, with notes, in 4to. 3. The book of Psalms in the Hebrew, put into the original poetical metre, 4to. In this last work, he pretends to have discovered the Hebrew metre, which was supposed to be irretrievably lost. But his hypothesis, though defended by some, yet has been confuted by several learned men, particularly by Dr. Lowth in his *Metrical Hæcane brevis Confutatio*, annexed to his lectures *De Sacra Poesi Hebræorum*.

HARESBURY, a town of Wiltshire, on the Willy, near Warminster, 94 miles from London, is in old records called *Heighbybury*, or *Heytbybury*; and now it is written Hatchbury. It was once the seat of the empress Maud. Here are fairs May 14th, and September 15th; and it has sent members to parliament ever since Henry VI. it being an ancient borough by prescription. There is an alms-house here for 12 poor men and a woman. Here is a collegiate church with four prebendaries, and a free-school, and the place is governed by a bailiff and burgesses.

HARFLEUR, a town of France, in the department of Lower Seine and late province of Normandy. Its fortifications have been long demolished, and its harbour choked up. The English took it by assault in 1415. It stands at the mouth of the Seine, 36 miles N. W. of Rouen. E. lon. 0. 19. N. lat. 49. 30.

HARIOT, or *HERIOT*, in law, a due belonging to a lord at the death of his tenant, consisting of the best beast, either horse or cow, or ox, which he had at the time of his death; and in some manors the best goods, piece of plate, &c. are called harlots.

HARLECH, a town of Merionethshire, with a market on Saturday. It is seated on a rock, on the sea-shore, and but a poor place, though the county town, and governed by a mayor, &c. It is distinguished by a castle built by Edward I. which is

almost entire. It is 223 miles W. N. W. of London. W. lon. 4. 6. N. lat. 52. 54.

HARLEIAN COLLECTION. A most valuable collection of useful and curious manuscripts, begun near the end of the last century, by Robert Harley of Brampton Bryan, Esq. in Herefordshire, afterwards earl of Oxford and lord high-treasurer; and which was conducted upon the plan of the great Sir Robert Cotton. He published his first considerable collection in August 1705, and in less than ten years he got together near 2500 rare and curious MSS. Soon after this, the celebrated Dr. George Hicks, Mr. Anstis garter king at arms, bishop Nicolson, and many other eminent antiquaries, not only offered him their assistance in procuring MSS. but presented him with several that were very valuable. Being thus encouraged to perseverance by his success, he kept many persons employed in purchasing MSS. for him abroad, giving them written instructions for their conduct. By these means the MS. library was, in the year 1721, increased to near 6000 books, 14,000 original charters, and 500 rolls. On the 2d of May 1724 lord Oxford died: but his son Edward, who succeeded to his honours and estate, still farther enlarged the collection; so that when he died, June 16th 1741, it consisted of 8000 volumes, several of them containing distinct and independent treatises, besides many loose papers which have been since sorted and bound up in volumes; and above 40,000 original rolls, charters, letters patent, grants, and other deeds and instruments of great antiquity. The principal design of making this collection was the establishment of a MS. English historical library, and the rescuing from destruction such national records as had eluded the diligence of preceding collectors; but lord Oxford's plan was more extensive; for his collection abounds also with curious MSS. in every science. This collection is now in the British Museum; and an enumeration of its contents may be seen in the Annual Register, Vol. vi. p. 140, &c.

HARLEM, a large and populous town of the United Provinces, in Holland, memorable for the siege it held out against the Spaniards in 1573, for ten months; the townsmen, before they capitulated, being reduced to eat the vilest animals, and even leather and grass. The church, which is the largest in Holland, is adorned with the finest organ in Europe. It consists of 8000 pipes; the largest 38 feet long, and 16 inches in diameter; and there are 68 stops, of which the most wonderful is the vox humana. Harlem is seated on the lake of the same name; and to the S. of the town is a wood, cut into delightful walks and vistas. This place claims the invention of printing; and, in fact, the first attempts in the art are indisputably to be attributed to Laurentius Costar, a magistrate of the city. It is situated 10 miles W. of Amsterdam. E. lon. 4. 38. N. lat. 52. 24.

HARLEM MERE, a lake of Holland, near Harlem, about 14 miles long and the same broad. It lies between Leyden, Harlem, and Amsterdam; and is navigable, but subject to dangerous storms; on which account, the canals from Leyden to Amsterdam were made, as a safer though more tedious passage.

HARLEQUIN, in the Italian comedy, a buffoon, dressed in party-coloured clothes; answering much the same purpose as a merry-andrew or jack-pudding in our drolls, on mountebanks' stages, &c. We have also introduced the harlequin upon our theatres; and this is one of the standing characters in the modern grotesque or pantomime entertainments. The term took its rise from a famous Italian comedian who came to Paris under Henry III. and who frequenting the house of M. de Harlay, his companions used to call him Harlequino, q. d. little Harlay; a name which has descended to all those of the same rank and profession.

HARLEY (Robert), earl of Oxford and Mortimer, was the eldest son of Sir Edward Harley, and born in 1661. At the

Revolution, Sir Edward and his son raised a troop of horse at their own expence; and after the accession of king William and queen Mary, he obtained a seat in parliament. His promotions were rapid: in 1702 he was chosen speaker of the house of commons; in 1704 he was sworn of queen Anne's privy council, and the same year made secretary of state; in 1706 he acted as one of the commissioners for the Treaty of Union; and in 1710 was appointed a commissioner of the treasury, and chancellor and under treasurer of the exchequer. A daring attempt was made on his life, March 8, 1711, by the marquis of Guiscard, a French papist; who, when under an examination before a committee of the privy council, stabbed him with a penknife. Of this wound, however, he soon recovered; and was the same year created earl of Oxford, and lord high-treasurer, which office he resigned just before the queen's death. He was impeached of high treason in 1715, and committed to the Tower; but was cleared by trial, and died in 1724. His character has been variously represented, but cannot be here discussed. He was not only an encourager of literature, but the greatest collector in his time of curious books and MSS. his collection of which makes a capital part of the British Museum. See *HARLEIAN Collection*.

HARLING, a town in Norfolk, with a market on Tuesday. It is seated on a rivulet, and the market is chiefly for linen cloth. It is a pretty, neat, genteel town, but has no church, and only a small chapel in the middle of the place, and a presbyterian meeting-house. It manufactures a little linen-cloth, and is 24 miles S. W. of Norwich, and 88 N. E. of London.

HARLINGEN, a seaport of the United Provinces, in Friesland, of which, next to Lewarden, it is the largest and most populous. It is 13 miles W. of Lewarden. E. lon. 5. 14. N. lat. 53. 9.

HARLOCH, or **HARLEICH**, a town of Merionethshire, in North Wales, 223 miles from London, on the sea coast, near the north-west point of the county. It is naturally strong, a garrison being kept here for the security of the coast. Its castle lies now in ruins. The town, though a corporation and governed by a mayor, makes but a very mean appearance. It has a market on Saturdays, and four fairs in the year.

HARLOT, a woman given to incontinency, or that makes a habit or trade of prostituting her body. The word is supposed to be used for the diminutive *whorelet*, a "little whore."—Others derive it from *Arletta*, mistress to Robert duke of Normandy, and mother to William the Conqueror: Camden derives it from one *Arlotha*, concubine to William the Conqueror: Others from the Italian *Arletta*, "a proud whore." Harlots were tolerated amongst the Jews, Greeks, and Romans. Fornication indeed was prohibited among the Jews, under severe penalties; but these they explained as extending only to women of their own nation. The public stews were therefore stocked with foreign prostitutes, who seem to have been taken under the protection of government. Hence appears the reason why the word *strange woman* is often found to signify a harlot. Prostitutes at first wore veils or masks; but by and by their modesty was entirely put to flight, and they went abroad bare faced. At Athens the prostitutes were generally strangers; and such as debauched an Athenian female were liable to a penalty. To frequent the public stews was not held disgraceful! The wisest of the Heathen sages allowed it! Solon permitted common whores to go publicly to the young men who had engaged them, and encouraged the youth of Athens to gratify their lust with these, rather than seduce and debauch the wives or daughters of citizens. Cato the Censor was of the same sentiments; and Cicero challenges all persons to name a time when men were either reprov'd for this practice, or not countenanced in it. Amongst the Jews, the harlots used to ply in the highways and

streets of cities; at Athens they frequented the *cerameicus*, *sciros*, and the old forum. In some places they were distinguished by their dress from other women. Corinth was a remarkable nursery of harlots, and gave birth to the noted *Lais*. Their accomplishments were oftentimes great, in all the polite and elegant parts of female education, viz. philosophy, dancing, singing, rhetoric, &c. *Aspasia*, the mistress of Pericles, was admired by Socrates for her learning. The more accomplished prostitutes frequently amassed large fortunes; a remarkable instance of which we have in Phryne, who offered to rebuild the walls of Thebes, when destroyed by Alexander, on condition that they would perpetuate her memory and profession by an inscription. Prostitutes at Rome were obliged to fix a bill over their doors, indicating their character and profession. It was also customary for them to change their names, after they had signified to the prætor their intention of leading such a dissolute life: this they did, because their trade was unbecoming their birth and condition; but they re-assumed their family names when they quitted their infamous mode of living. Women whose grandfather, father, or husband, had been a Roman knight, were forbidden by the laws to make a public profession of lewdness.

HARLOW, a town in Essex, whose market is now disused; but, on a common, two miles from the town, is a famous annual fair, on the 9th of September, for horses, cattle, &c. It is called Harlow Bush Fair, and is much frequented by the neighbouring gentry. Harlow is 17 miles W. of Chelmsford, and 23 N. E. of London. E. lon. 0. 12. N. lat. 51. 49.

HARMATTAN, the name of a remarkable periodical wind which blows from the interior parts of Africa towards the Atlantic ocean. Of this wind we have the following account in the *Philosophical Transactions*, vol. 71. furnished by Mr. Norris, a gentleman who had frequent opportunities of observing its singular properties and effects.

"On that part of the coast of Africa which lies between Cape Verd and Cape Lopez, an easterly wind prevails during the months of December, January, and February, which by the Fantees, a nation on the Gold coast, is called the *Harmattan*. Cape Verd is in 15 N. latitude, and Cape Lopez in 1 S. latitude; and the coast between these two Capes runs, in an oblique direction, nearly from W.S.W. to E.S.E. forming a range of upwards of 2100 miles. At the isles de Los, which are a little to the northward of Sierra Leone, and to the southward of Cape Verd, it blows from the E. S. E. on the Gold coast from the N. E. and at Cape Lopez, and the river Gabon, from the N. N. E. This wind is by the French and Portuguese, who frequent the Gold coast, called simply the N. E. wind, the quarter from which it blows. The English, who sometimes borrow words and phrases from the Fantee language, which is less guttural and more harmonious than that of their neighbours, adopt the Fantee word *Harmattan*.

The harmattan comes on indiscriminately at any hour of the day, at any time of the tide, or at any period of the moon, and continues sometimes only a day or two, sometimes five or six days, and it has been known to last fifteen or sixteen days. There are generally three or four returns of it every season. It blows with a moderate force, not quite so strong as the sea-breeze (which every day sets in during the fair season from the W. W. S. W. and S. W.); but somewhat stronger than the land wind at night from the N. and N. N. W.

1. A fog or haze is one of the peculiarities which always accompanies the harmattan. The gloom occasioned by this fog is so great, as sometimes to make even near objects obscure. The English fort at Whydah stands about the midway between the French and Portuguese forts, and not quite a quarter of a mile from either, yet very often from thence neither of the other forts can be discovered. The sun, concealed the greatest part

of the day, appears only a few hours about noon, and then of a mild red, exciting no painful sensation in the eye.

2. Extreme dryness makes another extraordinary property of this wind. No dew falls during the continuance of the harmattan; nor is there the least appearance of moisture in the atmosphere. Vegetables of every kind are very much injured; all tender plants, and most of the productions of the garden, are destroyed; the grass withers, and becomes dry like hay; the vigorous ever-greens likewise feel its pernicious influence; the branches of the lemon, orange, and lime-trees droop, the leaves become flaccid, wither, and if the harmattan continues to blow for 10 or 12 days, are so parched, as to be easily rubbed to dust between the fingers: the fruit of these trees, deprived of its nourishment, and stunted in its growth, only appears to ripen, for it becomes yellow and dry, without acquiring half the usual size. The natives take this opportunity of the extreme dryness of the grass and young trees to set fire to them, especially near their roads, not only to keep those roads open to travellers, but to destroy the shelter which long grass, and thickets of young trees, would afford to skulking parties of their enemies. A fire thus lighted flies with such rapidity as to endanger those who travel: in that situation, a common method of escape is, on discovering a fire to windward, to set the grass on fire to leeward, and then follow your own fire. There are other extraordinary effects produced by the extreme dryness of the harmattan.

The parching effects of this wind are likewise evident on the external parts of the body. The eyes, nostrils, lips, and palate, are rendered dry and uneasy; and drink is often required, not so much to quench thirst, as to remove a painful aridity in the fauces. The lips and nose become sore, and even chapped; and though the air be cool, yet there is a troublesome sensation of prickling heat on the skin. If the harmattan continues four or five days, the scarf skin peels off, first from the hands and face, and afterwards from the other parts of the body if it continues a day or two longer. Mr. Norris observed, that when sweat was excited by exercise on those parts which were covered by his clothes from the weather, it was peculiarly acrid, and tasted, on applying his tongue to his arm, something like spirits of harts horn diluted with water.

3. Salubrity forms a third peculiarity of the harmattan. Though this wind is so very prejudicial to vegetable life, and occasions such disagreeable parching effects on the human species, yet it is highly conducive to health. Those labouring under fluxes and intermitting fevers generally recover in an harmattan. Those weakened by fevers, and sinking under evacuations for the cure of them, particularly bleeding, which is often injudiciously repeated, have their lives saved, and vigour restored, in spite of the doctor. It stops the progress of epidemics: the small-pox, remittent fevers, &c. not only disappear, but those labouring under these diseases, when an harmattan comes on, are almost certain of a speedy recovery. Infection appears not then to be easily communicated even by art. In the year 1770, there were on board the Unity, at Whydah, above 300 slaves; the small-pox broke out among them, and it was determined to inoculate; those who were inoculated before the harmattan came on, got very well through the disease. About 70 were inoculated a day or two after the harmattan set in, but no one of them had either sickness or eruption. It was imagined that the infection was effectually dispersed, and the ship clear of the disorder; but in a very few weeks it began to appear among those seventy. About 50 of them were inoculated the second time; the others had the disease in a natural way: an harmattan came on, and they all recovered, excepting one girl, who had an ugly ulcer on the inoculated part, and died some time afterwards of a locked jaw."

This account differs remarkably from that given by Dr. Lind,

who calls the harmattan a malignant and fatal wind: (See his *Diseases of Hot Climates*.) As to the nature of the soil over which it blows, it appears, that, excepting a few rivers and some lakes, the country about and beyond Whydah is covered for 400 miles back with verdure, open plains of grass, clumps of trees, and some woods of no considerable extent. The surface is sandy, and below that a rich reddish earth: it rises with a gentle ascent for 150 miles from the sea, before there is the appearance of a hill, without affording a stone of the size of a walnut. Beyond these hills there is no account of any great ranges of mountains.

HARMODIUS, a friend of Aristogiton, who delivered his country from the tyranny of the Pisistratidæ. (See ARISTOGITON.) The Athenians, to reward the patriotism of these illustrious citizens, made a law that no one should ever after bear the name of Aristogiton and Harmodius.

HARMONIA, in fabulous history, the wife of Cadmus, both of whom were turned into serpents. See CADMUS. Though many of the ancient authors make Harmonia a princess of divine origin, there is a passage in Athenæus from Euhemerus, the Vanini of his time, which tells us, that she was by profession a player on the flute, and in the service of the prince of Zidon previous to her departure with Cadmus. This circumstance, however, might encourage the belief, that as Cadmus brought letters into Greece, his wife brought *harmony* thither; as the word ἀρμονία, *harmonia*, has been said to have no other derivation than from her name: which makes it very difficult to ascertain the sense in which the Greeks made use of it in their music; for it has no roots by which it can be compounded, in order to deduce from them its etymology. The common account of the word, however, that is given by lexicographers, and generally adopted by the learned, does not confirm this opinion. It is generally derived from ἀρμολω, and this from the old verb αἰω ἀπλο, to fit or join.

HARMONIC. As an adjective, it signifies in general any thing belonging to harmony; though in our language the adjective is more properly written *harmonical*. In this case it may be applied to the *harmonical* divisions of a monochord; or, in a word, to consonances in general. As a substantive neuter, it imports all the concomitant or accessory sounds which, upon the principles resulting from the experiments made on sonorous bodies, attend any given sound whatever, and render it appretiable. Thus all the aliquot parts of a musical string produce *harmonical* sounds, or *harmonics*.

HARMONICA. This word, when originally appropriated by Dr. Franklin to that peculiar form or mode of musical glasses, which he himself, after a number of happy experiments, had constituted, was written *Armonica*. In this place, however, we have ventured to restore it to its native plenitude of sound, as we have no antipathy against the moderate use of aspirations. It is derived from the Greek word ἀρμονία. The radical word is ἀρμω, to suit or fit one thing to another. By the word ἀρμονία the Greeks expressed *aptitudes* of various kinds; and from the use which they made of that expression, we have reason to conclude, that it was intended to import the highest degree of refinement and delicacy in those relations which it was meant to signify. Relations or aptitudes of sound, in particular, were understood by it; and in this view, Dr. Franklin could not have selected a name more expressive of its nature and genius for the instrument which we are now to describe; as, perhaps, no musical tone can possibly be finer, nor consequently susceptible of juster concords, than those which it produces.

It has been said, that the elements or first approaches to music by glasses were conveyed in an old English book, from which rude and barbarous hints perhaps, Mr. Puckeridge afterwards improved. But, for a farther account of him, of the state in which he left the instrument, and of the state to which it

was afterwards carried, we must refer to the following extracts from Dr. Franklin and others.

" Perhaps (says the Doctor in his letter to Father Beccaria) it may be agreeable to you, as you live in a musical country, to have an account of the new instrument lately added here to the great number that charming science was possessed of before. As it is an instrument that seems peculiarly adapted to Italian music, especially that of the soft and plaintive kind, I will endeavour to give you such a description of it, and of the manner of constructing it, that you or any of your friends may be enabled to imitate it, if you incline so to do, without being at the expense and trouble of the many experiments I have made in endeavouring to bring it to its present perfection.

" You have doubtless heard the sweet tone that is drawn from a drinking-glass, by pressing a wet finger round its brim. One Mr. Puckeridge, a gentleman from Ireland, was the first who thought of playing tunes formed of these tones. He collected a number of glasses of different sizes; fixed them near each other on a table; and tuned them, by putting into them water, more or less as each note required. The tones were brought out by pressing his fingers round their brims. He was unfortunately burnt here, with his instrument, in a fire which consumed the house he lived in. Mr. E. Delaval, a most ingenious member of our Royal Society, made one in imitation of it, with a better choice and form of glasses, which was the first I saw or heard. Being charmed with the sweetness of its tones, and the music he produced from it, I wished to see the glasses disposed in a more convenient form, and brought together in a narrower compass, so as to admit of a greater number of tones, and all within reach of hand to a person sitting before the instrument; which I accomplished, after various intermediate trials, and less commodious forms, both of glasses and construction, in the following manner:

" The glasses are blown as near as possible in the form of hemispheres, having each an open neck or socket in the middle. The thickness of the glass near the brim is about the tenth of an inch, or hardly so much, but thicker as it comes nearer the neck; which in the largest glasses is about an inch deep, and an inch and a half wide within; these dimensions lessening as the glasses themselves diminish in size, except that the neck of the smallest ought not to be shorter than half an inch. The largest glass is nine inches diameter, and the smallest three inches. Between these there are 23 different sizes, differing from each other a quarter of an inch in diameter. To make a single instrument there should be at least six glasses blown of each size; and out of this number one may probably pick 37 glasses (which are sufficient for three octaves with all the semitones) that will be each either the note one wants, or a little sharper than that note, and all fitting so well into each other as to taper pretty regularly from the largest to the smallest. It is true that there are not 37 sizes; but it often happens that two of the same size differ a note or half a note in tone, by reason of a difference in thickness, and these may be placed one in the other without sensibly hurting the regularity of the taper form.

" The glasses being chosen, and every one marked with a diamond the note you intend it for, they are to be tuned by diminishing the thickness of those that are too sharp. This is done by grinding them round from the neck towards the brim, the breadth of one or two inches as may be required; often trying the glass by a well-tuned harpsichord, comparing the note drawn from the glass by your finger with the note you want, as sounded by that string of the harpsichord. When you come near the matter, be careful to wipe the glass clean and dry before each trial, because the tone is something flatter when the glass is wet than it will be when dry; and grinding a very little between each trial, you will thereby tune to great exactness. The more care is necessary in this, because if you go below

your required tone, there is no sharpening it again but by grinding somewhat off the brim, which will afterwards require polishing, and thus increase the trouble.

" The glasses being thus tuned, you are to be provided with a case for them, and a spindle on which they are to be fixed. My case is about three feet long, eleven inches every way wide within at the biggest end, and five inches at the smallest end; for it tapers all the way, to adapt it better to the conical figure of the set of glasses. This case opens in the middle of its height, and the upper part turns up by hinges fixed behind. The spindle is of hard iron, lies horizontally from end to end of the box within, exactly in the middle, and is made to turn on brass gudgeons at each end. It is round, an inch diameter at the thickest end, and tapering to a quarter of an inch at the smallest. A square shank comes from its thickest end through the box, on which shank a wheel is fixed by a screw. This wheel serves as a fly to make the motion equable, when the spindle, with the glasses, is turned by the foot like a spinning-wheel. My wheel is of mahogany, 18 inches diameter, and pretty thick, so as to conceal near its circumference about 25 lb. of lead. An ivory pin is fixed in the face of this wheel, about four inches from the axis. Over the neck of this pin is put the loop of the string that comes up from the moveable step to give it motion. The case stands on a neat frame with four legs.

" To fix the glasses on the spindle, a cork is first to be fitted in each neck pretty tight, and projecting a little without the neck, that the neck of one may not touch the inside of another when put together, for that would make a jarring. These corks are to be perforated with holes of different diameters, so as to suit that part of the spindle on which they are to be fixed. When a glass is put on, by holding it stiffly between both hands, while another turns the spindle, it may be gradually brought to its place. But care must be taken that the hole be not too small, lest in forcing it up the neck should split; nor too large, lest the glass, not being firmly fixed, should turn or move on the spindle, so as to touch or jar against its neighbouring glass. The glasses thus are placed one in another; the largest on the biggest end of the spindle, which is to the left hand: the neck of this glass is towards the wheel; and the next goes into it in the same position, only about an inch of its brim appearing beyond the brim of the first; thus proceeding, every glass when fixed shows about an inch of its brim (or three quarters of an inch, or half an inch, as they grow smaller) beyond the brim of the glass that contains it; and it is from these exposed parts of each glass that the tone is drawn, by laying a finger on one of them as the spindle and glasses turn round.

" My largest glass is G a little below the reach of a common voice, and my highest G, including three complete octaves. To distinguish the glasses more ready to the eye, I have painted the apparent parts of the glasses within-side, every semitone white, and the other notes of the octave with the seven prismatic colours; *viz.* C, red; D, orange; E, yellow; F, green; G, blue; A, indigo; B, purple; and C, red again; so that the glasses of the same colour (the white excepted) are always octaves to each other.

" This instrument is played upon by sitting before the middle of the set of glasses, as before the keys of a harpsichord, turning them with the foot, and wetting them now and then with a sponge and clean water. The fingers should be first a little soaked in water, and quite free from all greasiness; a little fine chalk upon them is sometimes useful, to make them catch the glass and bring out the tone more readily. Both hands are used, by which means different parts are played together. Observe, that the tones are best drawn out when the glasses turn from the ends of the fingers, not when they turn to them.

" The advantages of this instrument are, that its tones are

incomparably sweet beyond those of any other ; that they may be swelled and softened at pleasure by stronger or weaker pressures of the finger, and continued to any length ; and that the instrument, being once well tuned, never again wants tuning."

Such was the state in which this learned and ingenious author found, and such the perfection to which he carried, that celestial instrument of which we now treat. We call it *celestial* ; because, in comparison with any other instrument which we know, the sounds that it produces are indeed heavenly. Some of them, however, are still constructed in the same imperfect manner as the instrument of Mr. Puckeridge. They are contained in an oblong chest ; their positions are either exactly or nearly rectilinear ; the artificial semitones by which the full notes are divided, form another parallel line ; but the distances between each of them are much greater than those between the notes of the natural scale, as they take their places, not directly opposite to the notes which they are intended to heighten or depress, but in a situation between the highest and lowest, to show, that in ascending they are sharps to the one, and in descending flats to the other. This structure, however, is doubly inconvenient ; for it not only increases the labour and difficulty of the performer, but renders some musical operations impracticable, which upon the *Harmonica*, as constituted by Dr. Franklin, may be executed with ease and pleasure. In this fabric, if properly formed and accurately tuned, the instrument is equally adapted to harmony and melody. But as no material structure could ever yet be brought to the perfection even of human ideas, this instrument still in some measure retains the perverse nature of its original stamina. Hence it is not without the utmost difficulty that the glasses can be tuned by grinding ; and the least conceivable redundancy or defect renders the discord upon this instrument more conspicuous and intolerable than upon any other. Hence likewise that inexpressible delicacy to be observed in the manner of the friction by which the sound is produced ; for if the touch be too gentle, it cannot extort the tone ; and if too strong, besides the mellow and delicate sound which ought to be heard, we likewise perceive the finger jarring upon the glass, which, mingled with those softer sounds by which the senses had been soothed, gives a feeling similar to iron grating upon iron, but more disagreeable. In wind-instruments the operation of the tongue, in harpsichords the stroke of the quill, and on the violin the motion of the bow, gives that strong and sensible interruption of sound which may be called *articulation*, and which renders the rhythmus or measure of an air more perceptible : but, upon the glasses, the touch of the finger is too soft to divide the notes with so much force ; so that, unless the mind be steadily attentive, they seem to melt one into another, by which means the idea of rhythmus is almost lost. There is no way of performing a slur but by forbearing to stop the first sound, when that which is immediately subsequent commences. Thus, when the slur is of any length, and regularly descends or rises by the interval of a second, all the notes in the slur must be heard together, and produce no agreeable dissonance ; yet if it rises or descends by perfect chords, the effect is pleasing. The open shake, or thrill, is another unhappy operation upon musical glasses ; which can only be performed by the alternate pulsations of two continued sounds, differing from each other only by a note or semitone. But as these pulsations thus managed cannot be distinct, the result is far from being pleasant ; nor is there any succedaneum for the close shake, which in the violin is performed by alternately depressing the string to the finger-board, and suffering it to rise without entirely removing the finger from it, and which, by giving the note that tremulous sound produced by the human voice affected with grief, is a grace peculiarly adapted to pathetic and plaintive airs. We proceed, however, to a farther account of the same instrument,

extracted from the Annual Register, vol. iv. p. 149. " Besides those tones (says the author of that account) which every elastic string produces by a vibration of all its parts, it is capable of another set of tones, in which only a part of the string is supposed to vibrate. These sounds are produced by the lightest touches, either by air, as in Oswald's lyre, or by rubbing the bow in the softest manner on the string of a fiddle.

" Analogous to these sounds are those produced by bells : in those last, besides those tones produced by their elliptical vibrations, there are a set of tones which may be brought by gently rubbing their edges, and in which the whole instrument does not appear to vibrate in all its parts as before.

" Take, for instance, a bell finely polished at the edges ; or, what will perhaps be more convenient, a drinking-glass : let the edges be as free from any thing oily as possible ; then, by moistening the finger in water (I have found alum-water to be best), and rubbing it circularly round the edge of the glass, you will at length bring out the tone referred to.

" This note is possessed of infinite sweetness ; it has all the excellencies of the tone of a bell without its defects. It is loud, has a sufficient body, is capable of being swelled and continued at pleasure ; and, besides, has naturally that vibratory softening which musicians endeavour to imitate by mixing with the note to be played a quarter tone from below.

" To vary these tones, nothing more is required than to procure several bells or glasses of different tones, tuned as nearly as possible, which may be done by thinning the edges of either : or, for immediate satisfaction, the glasses may be tuned by pouring in water ; the more water is poured in, the graver the tone will be.

" Let us suppose then a double octave of those glasses, thus tuned, to be procured. Any common tune may be executed by the fingers rubbing upon each glass successively ; and this I have frequently done without the least difficulty, only choosing those tunes which are slow and easy. Here then are numbers of delicate tones, with which musicians have been till very lately unacquainted ; and the only defect is, that they cannot be made to follow each other with that celerity and ease which is requisite for melody. In order to remedy this, I took a large drinking-glass, and by means of a wheel and gut, as in the electrical machine, made it to turn upon its axis with a moderately quick but equable motion ; then moistening the finger as before, nothing more was required than merely to touch the glass at the edge, without any other motion, in order to bring out the tone.

" Instead of one glass only turning in this manner, if the whole number of glasses were so fixed as to keep continually turning by means of a wheel, it follows, that upon every touch of the finger a note would be expressed ; and thus, by touching several glasses at once, an harmony of notes might be produced, as in an harpsichord.

" As I write rather to excite than satisfy the curious, I shall not pretend to direct the various ways this number of glasses may be contrived to turn ; it may be sufficient to say, that if the glasses are placed in the segment of a circle, and then a strap, as in a cutler's wheel, be supposed to go round them all, the whole number will by this means be made to turn by means of a wheel.

" Instead of the finger, I have applied moistened leather to the edge of the glass, in order to bring out the tone : but, for want of a proper elasticity, this did not succeed. I tried cork, and this answered every purpose of the finger ; but made the tone much louder than the finger could do. Instead, therefore, of the finger, if a number of corks were so contrived as to fall with a proper degree of pressure on the edge of the glass, by means of keys like the jacks of an organ, it is evident, that in such a case a new and tolerably perfect instrument would be

Fig. 1.



Fig. 2.

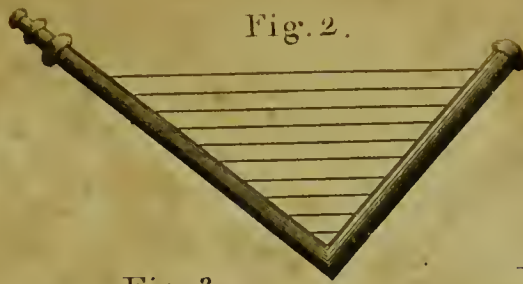


Fig. 5.



Fig. 3.

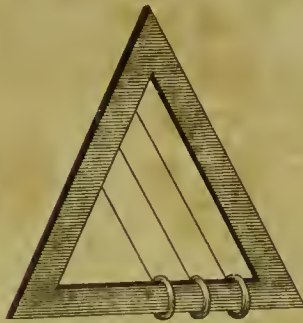
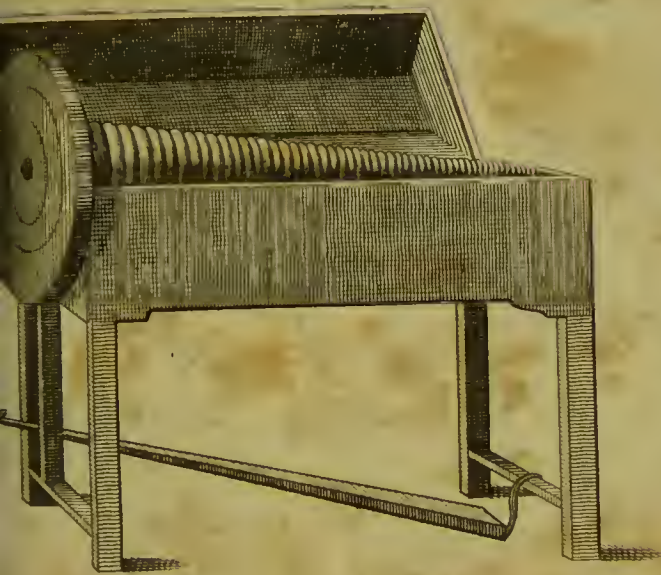


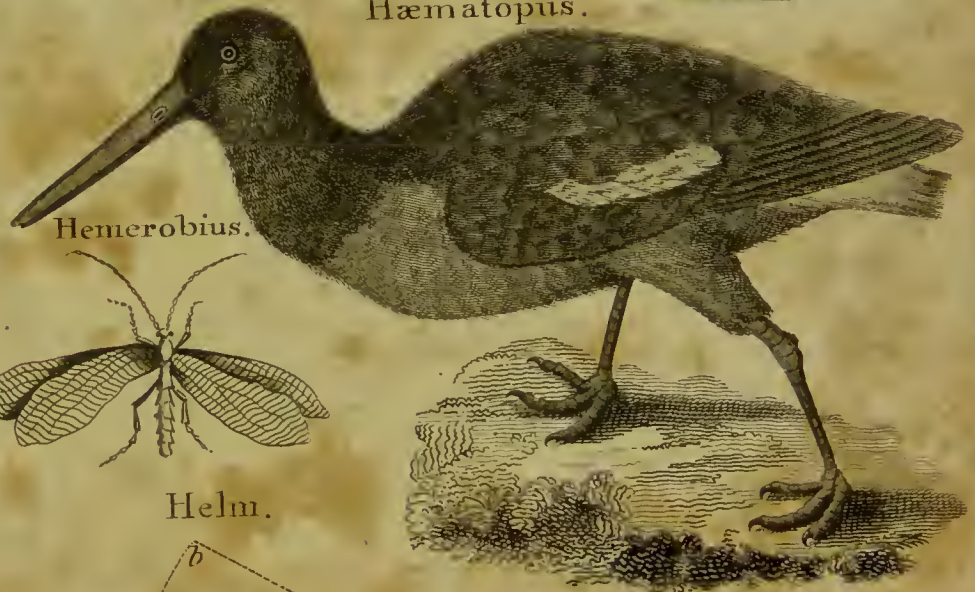
Fig. 4.



Harmonica.



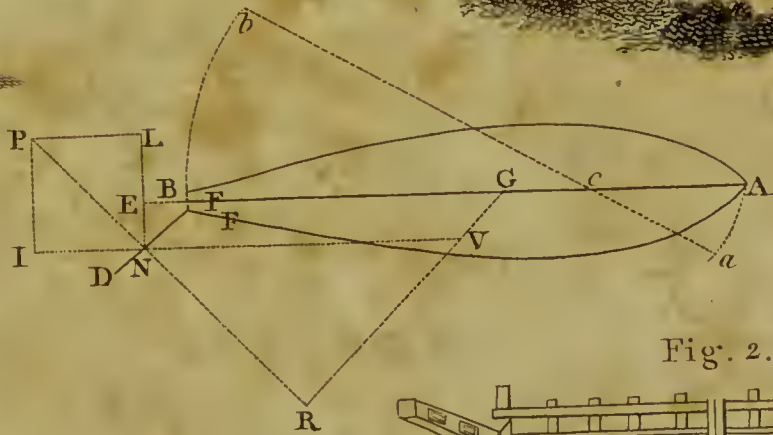
Hæmatopus.



Hemerobius.



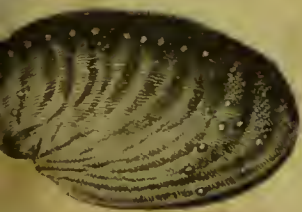
Helm.



Hippobosca.



Haliotis.



Helix.

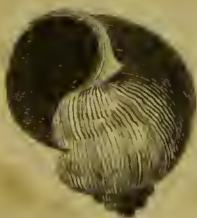


Fig. 1.

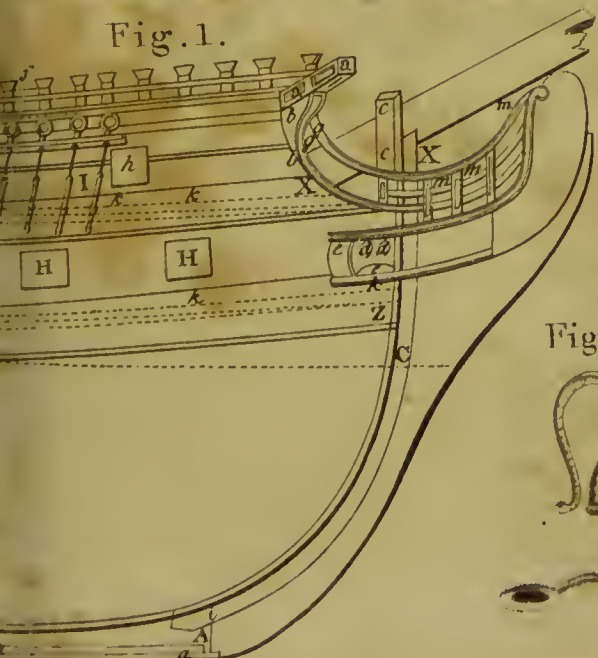
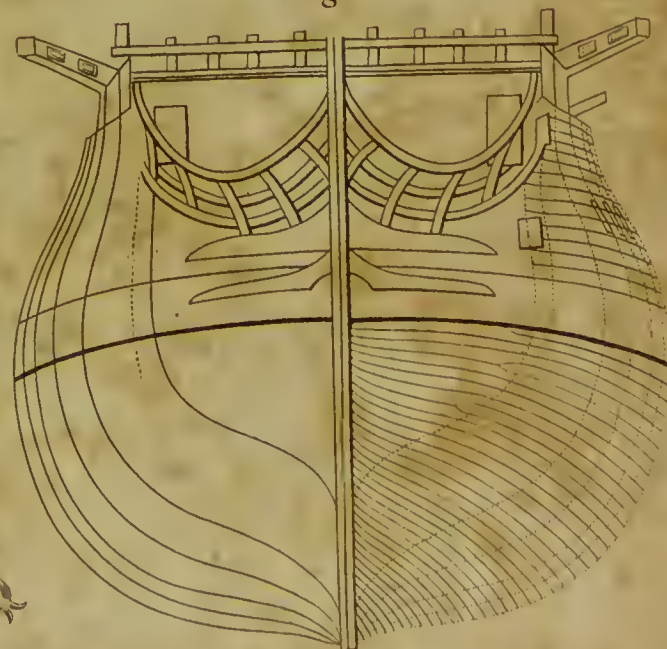


Fig. 2.



HIRUDO.

Fig. 1.



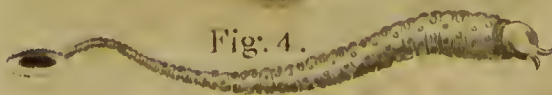
Fig. 2.

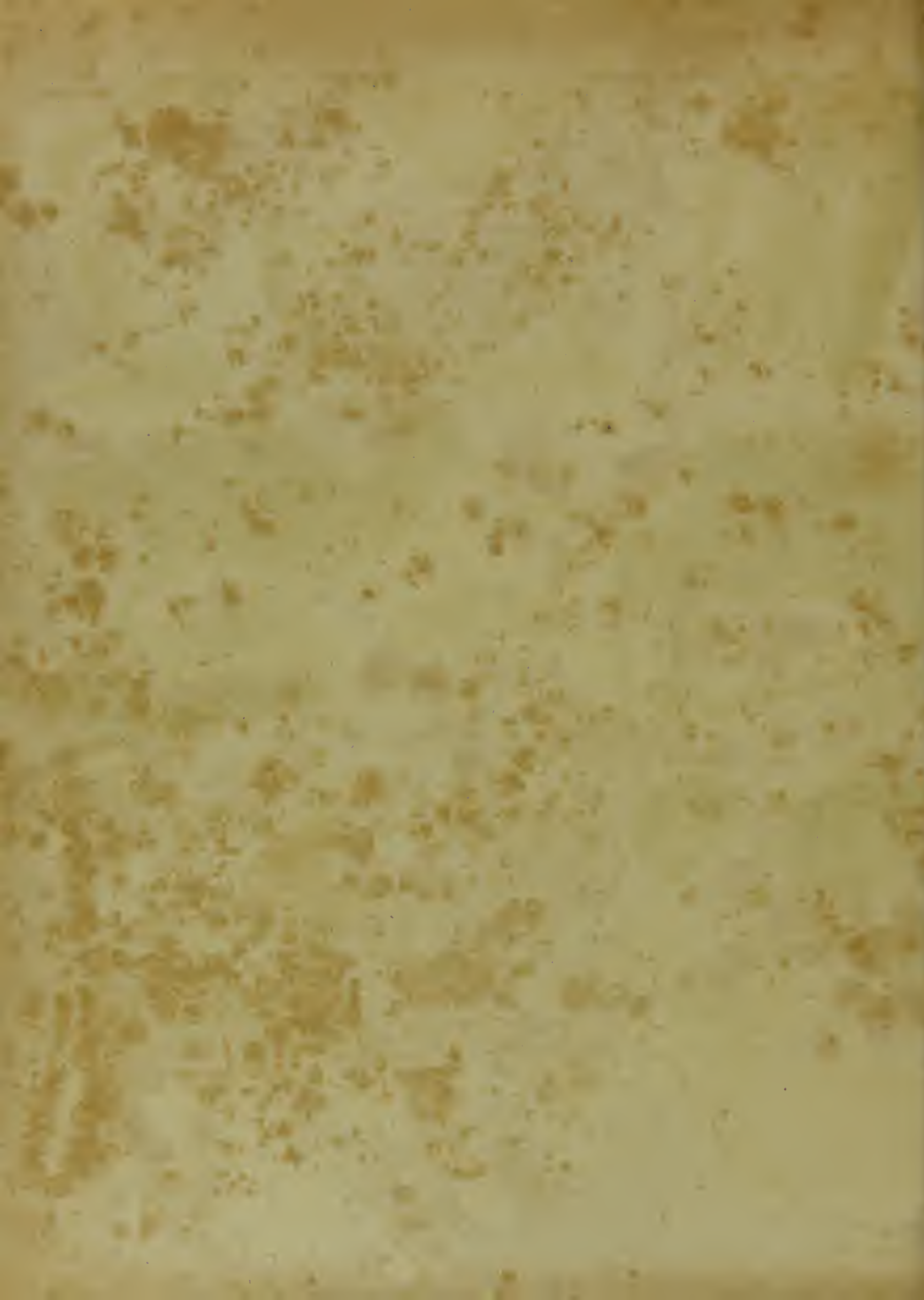


Fig. 3.



Fig. 4.





produced ; not so loud indeed as some, but infinitely more melodious than any.

“ The mouths of the glasses or bells used in this experiment should not resemble the mouth of a trumpet, but should rather come forward with a perpendicular edge. The corks used in this case should be smooth, even, free from those blemishes which are usually found in them, and at the same time the more elastic the better.”

In the two accounts here given, seems to be comprehended every thing valuable which has been said upon the subject. It remains, however, our decided opinion, that the form and structure designed and recommended by Dr. Franklin is by much the most eligible ; nor can we admit, that a cork, however successfully applied, will produce the same mellowness and equality of tone in general with the finger. It appears also, that, by this kind of voluntary attrition, a note may be sunk or swelled with much more art and propriety than by the substitution of any thing else extrinsic to the hand ; and when chords are long protracted, that degree of friction, which renders every sound in the chord sensible to the ear, without harshness, must be the most agreeable. For this reason, likewise, we should recommend alum-water in preference to chalk.

From what has already been said, it will easily be perceived, that this instrument requires to be tuned with the nicest degree of delicacy which the laws of TEMPERAMENT will possibly admit. For these laws the reader will naturally have recourse to the article MUSIC ; and it is only necessary farther to observe, that the same rules which conduct the process of tuning a harpsichord, will be equally effectual in tuning the *Harmonica* ; with this only difference, that greater delicacy in adjusting the chords should, if practicable, be attempted.

In plate 3, we have given a representation of an instrument of this kind, made by Mr. Dobb. Dr. Edmund Cullen of Dublin has attempted an improvement on the harmonica of Dr. Franklin, but, we think, with no great share of success.

HARMONY. The sense which the Greeks gave to this word in their music, is so much less easy to be determined, because, the word itself being originally a substantive proper, it has no radical words by which we might analyse it, to discover its etymology. In the ancient treatises which remain to us, *harmony* appears to be that department whose object is the agreeable succession of sounds, merely considered as high or low ; in opposition to the two others called *rhythmica* and *metrica*, which have their principle in time and measure. This leaves our ideas concerning that aptitude of sound vague and undetermined ; nor can we fix them without studying for that purpose all the rules of the art ; and even after we have done so, it will be very difficult to distinguish harmony from melody, unless we add to the last the ideas of rhythmus and measure ; without which, in reality, no melody can have a distinguishing character : whereas harmony is characterised by its own nature, independent of all other quantities except the chords or intervals which compose it.

It appears by a passage of Nicomachus, and from others, that they likewise gave the name of *harmory* to the chord of an octave, and to concerts of voices and instruments, which performed in the distance of an octave one from the other, and which is more commonly called *antiphona*.

Harmony, according to the moderns, is a succession of chords agreeable to the laws of modulation. For a long time this harmony had no other principle but such rules as were almost arbitrary, or solely founded on the approbation of a practised ear, which decided concerning the agreeable or disagreeable succession of chords, and whose determinations were at last reduced to calculation. But father Mersenne and M. Saver having found that every sound, however simple in appearance, was always accompanied with other sounds less sensible, which constitute

with itself a perfect chord-major ; with this experiment M. Rameau set out, and upon it formed the basis of his harmonic system, which he has extended to a great many volumes, and which at last M. D'Alembert has taken the trouble of explaining to the public.

Signior Tartini, taking his route from an experiment which is newer and more delicate, yet not less certain, has reached conclusions similar enough to those of Rameau, by pursuing a path whose direction seems quite opposite. According to M. Rameau, the treble is generated by the bass ; Signior Tartini makes the bass result from the treble. One deduces harmony from melody, and the other supposes quite the contrary. To determine from which of the two schools the best performances are likely to proceed, no more is necessary than to investigate the end of the composer, and discover whether the air is made for the accompaniments, or the accompaniments for the air. At the word SYSTEM in Rousseau's Musical Dictionary, is given a delineation of that published by Signior Tartini. Here he continues to speak of M. Rameau, whom he has followed through this whole work, as the artist of greatest authority in the country where he writes.

He thinks himself obliged, however, to declare, that this system, however ingenious it may be, is far from being founded upon nature ; an affirmation which he incessantly repeats : “ that it is only established upon analogies and congruities, which a man of invention may overturn to-morrow, by substituting others more natural : that, in short, of the experiments from whence he deduces it, one is detected fallacious, and the other will not yield him the consequences which he would extort from it. In reality, when this author took it in his head to dignify with the title of *demonstration* the reasonings upon which he established his theory, every one turned the arrogant pretence into ridicule. The Academy of Sciences loudly disapproved a title so ill founded, and so gratuitously assumed ; and M. Eflive, of the Royal Society at Montpellier, has shown him, that even to begin with this proposition, That according to the law of nature, sounds are represented by their octaves, and that the octaves may be substituted for them, there was not any one thing demonstrated, or even firmly established, in his pretended demonstration.” He returns to his system.

“ The mechanical principle of resonance presents us with nothing but independent and solitary chords ; it neither prescribes nor establishes their succession. Yet a regular succession is necessary ; a dictionary of selected words is not an oration, nor a collection of legitimate chords a piece of music ; there must be a meaning, there must be connections in music as well as in language : it is necessary that what has preceded should transmit something of its nature to what is subsequent, so that all the parts conjoined may form a whole, and be stamped with the genuine character of unity.

“ Now, the complex sensation which results from a perfect chord must be resolved into the simple sensation of each particular sound which composes it, and into the sensation of each particular interval which forms it, ascertained by comparison one with another. Beyond this there is nothing sensible in any chord ; from whence it follows, that it is only by the relation between sounds, and by the analogy between intervals, that the connection now in question can be established ; and this is the genuine, the only source, from whence flow all the laws of harmony and modulation. If, then, the whole of harmony were only formed by a succession of perfect chords-major, it would be sufficient to proceed by intervals similar to those which compose such a chord ; for then some one or more sounds of the preceding chord being necessarily protracted in that which is subsequent, all the chords would be sound sufficiently connected, and the harmony would, at least in this sense, be one.

" But besides that these successions must exclude all melody by excluding the diatonic series which forms its foundation, it would not arrive at the real end of the art ; because, as music is a system of meanings like a discourse, it ought, like a discourse, to have its periods, its phrases, its suspenses, its cadences, its punctuation of every kind ; and because the uniformity of a harmonical procedure implies nothing of all this, diatonic procedures require that major and minor chords should be intermixed ; and the necessity of dissonances has been felt in order to distinguish the phrases, and render the cadences sensible. Now, a connected series of perfect chords-major can neither be productive of perfect chords-minor nor of dissonances, nor can sensibly mark any musical phrase, and the punctuation must there be found entirely defective.

" M. Rameau being absolutely determined, in his system, to deduce from nature all the harmony practised among us, had recourse, for this effect, to another experiment of his own invention, of which I have formerly spoken, and which by a different arrangement is taken from the first. He pretended, that any simple sound whatever afforded in it multiplies a perfect minor or flat chord, of which it was the dominant or fifth, as it furnished a perfect chord major by the vibration of its aliquot parts, of which it is the tonic or fundamental sound. He has assumed as a certain fact, that a vocal string caused two others lower than itself to vibrate through their whole extent, yet without making them produce any sound, one to its twelfth major, and the other to its seventeenth ; and from this joined to the former fact, he has very ingeniously deduced, not only the application of the minor mode and of dissonances in harmony, but the rules of harmonic phrases and of all modulation, such as they are found at the words *Chord, Accompaniment, Fundamental Bass, Cadence, Dissonance, Modulation*.

" But first (continues Rousseau), the experiment is false. It is discovered, that the strings tuned beneath the fundamental sound do not entirely vibrate when this fundamental sound is given ; but that they are divided in such a manner as to return its unison alone, which of consequence can have no harmonics below. It is moreover discovered, that the property of strings in dividing themselves, is not peculiar to those which are tuned by a twelfth and seventeenth below the principal sound ; but that oscillations are likewise produced in the lower strings by all its multiples. Whence it follows, that, the intervals of the twelfth and seventeenth below not being singular phenomena of their kind, nothing can be concluded in favour of the perfect minor chord which they represent.

" Though the truth of this experiment were granted, even this would by no means remove the difficulty. If, as M. Rameau alleges, all harmony is derived from the resonance of sonorous bodies, it cannot then be derived only from the vibrations of such bodies as do not resound. In reality, it is an extraordinary theory, to deduce from bodies that do not resound the principles of harmony ; and it is a position in natural philosophy no less strange, that a sonorous body should vibrate without resounding, as if sound itself were any thing else but the air impelled by these vibrations. Moreover, sonorous bodies do not only produce, besides the principal sound, the other tones which with itself compose a perfect chord ; but an infinite number of other sounds, formed by all the aliquot parts of the bodies in vibration, which do not enter into that perfect harmony. Why then should the former sounds produce consonances, and why should the latter not produce them, since all of them equally result from nature ?

" Every sound exhibits a chord truly perfect, since it is composed of all its harmonics, and since it is by them that it becomes a sound. Yet these harmonics are not heard, and nothing is distinguished but a simple sound, unless it be exceedingly strong : whence it follows, that the only good harmony is

an unison ; and that, as soon as the consonances can be distinguished, the natural proportion being altered, the harmony has lost its purity.

" That alteration is in this case produced two different ways. First, by causing certain harmonics to resound, and not the others, the proportion of force which ought to prevail in all of them is altered, for producing the sensation of a single sound ; whence the unity of nature is destroyed. By doubling these harmonics, an effect is exhibited similar to that which would be produced by suppressing all the others ; for in that case we cannot doubt, but that, along with the generating sound, the tones of the other harmonics which were permitted to sound would be heard : whereas, in leaving all of them to their natural operations, they destroy one another, and conspire together in forming and strengthening the simple sensation of the principal sound. It is the same effect which the full sound of a stop in the organ produces, when, by successively removing the stopper or register, the third and fifth are permitted to sound with the principal ; for then that fifth and third, which remained absorbed in the other sounds, are separately and disagreeably distinguished by the ear.

" Moreover, the harmonics which we cause to sound have other harmonics pertaining to themselves, which cannot be such to the fundamental sound. It is by these additional harmonics that the sounds which produce them are distinguished with a more sensible degree of harshness ; and these very harmonics which thus render the chord perceptible, do not enter into its harmony. This is the reason why the most perfect chords are naturally displeasing to ears whose relish for harmony is not sufficiently formed ; and I have no hesitation in thinking, that even the octave itself might be displeasing, if the mixture of male and female voices did not inure us to that interval from our infancy.

" With dissonance it is still worse ; because, not only the harmonics of the sound by which the discord is produced, but even the sound itself, is excluded from the natural harmony of the fundamental : which is the cause why discord is always distinguished amongst all the other sounds in a manner shocking to the sense.

" Every key of an organ, with the stop fully opened, gives a perfect chord with its third major, which are not distinguished from the fundamental sound, if the hearer is not extremely attentive, and if he does not sound the whole stop in succession ; but these harmonic sounds are never absorbed in the fundamental, but on account of the prodigious noise, and by such a situation of the registers as may cause the pipes which produce the fundamental sound to conceal by their force the other sounds which produce these harmonics. Now, no person observes, nor can observe, this continual proportion in a concert ; since, by the manner of inverting the harmony, its greatest force must in every instant be transferred from one part to another ; which is not practicable, and would destroy the whole melody.

" When we play upon the organ, every key in the bass causes to resound the perfect chord major ; but because that bass is not always fundamental, and because the music is often modulated in a perfect minor chord, this perfect chord-major is rarely struck with the right hand ; so that we hear the third minor with the major, the fifth with the triton, the seventh redundant with the octave, and a thousand other cacophonies, which, however, do not much disgust our ears, because habit renders them tractable ; but it is not to be imagined that an ear naturally just would prove so patient of discords, when first exposed to the test of this harmony.

" M. Rameau pretends, that trebles composed with a certain degree of simplicity naturally suggest their own basses ; and that any man having a just, though unpractised ear, would spontaneously sing that bass. This is the prejudice of a musician, re-

futed by universal experience. Not only would he, who has never heard either bass or harmony, be of himself incapable of finding either the bass or the harmony of M. Rameau, but they would be displeasing to him if he heard them, and he would greatly prefer the simple unison.

“ When we consider, that, of all the people upon earth, who have all of them some kind of music and melody, the Europeans are the only people who have a harmony consisting of chords, and who are pleased with this mixture of sounds; when we consider that the world has endured for so many ages, whilst, of all the nations which cultivated the fine arts, not one has found out this harmony: that not one animal, not one bird, not one being in nature, produces any other chord but the unison, nor any other music but melody: that the eastern languages, so sonorous, so musical; that the ears of the Greeks, so delicate, so sensible, practised and cultivated with so much art, have never conducted this people, luxurious and enamoured of pleasure as they were, towards this harmony which we imagined so natural: that without it their music produced such astonishing effects; that with it ours is so impotent: that, in short, it was reserved for the people of the north, whose gross and callous organs of sensation are more affected with the noise and clamour of voices, than with the sweetness of accents and the melody of inflections, to make this grand discovery, and to vend it as the essential principle upon which all the rules of the art were founded; when, in short, attention is paid to all these observations, it is very difficult not to suspect that all our harmony is nothing but a Gothic and barbarous invention, which would never have entered into our minds, had we been truly sensible to the genuine beauties of art, and of that music which is unquestionably natural.

“ M. Rameau asserts, however, that harmony is the source of the most powerful charms in music. But this notion is contradictory both to reason and to matter of fact. To fact it is contradictory; because, since the invention of counter-point, all the wonderful effects of music have ceased, and it has lost its whole force and energy. To which may be added, that such beauties as purely result from harmony are only perceived by the learned; that they affect none with transport but such as are deeply conversant in the art: whereas the real beauties of music, resulting from nature, ought to be, and certainly are, equally obvious to the adept and the novice. To reason it is contradictory; since harmony affords us no principle of imitation by which music, in forming images and expressing sentiments, can rise above its native excellence till it becomes in some measure dramatic or imitative, which is the highest pitch of elevation and energy to which the art can aspire; since all the pleasures which we can receive from the mere mechanical influence of sounds are extremely limited, and have very little power over the human heart.”

Thus far we have heard M. Rousseau, in his observations on harmony, with patience; and we readily grant, that the *system of harmony* by M. Rameau is neither demonstrated, nor capable of demonstration. But it will not follow, that any man of invention can so easily and so quickly subvert those aptitudes and analogies on which the system is founded. Every hypothesis is admitted to possess a degree of probability proportioned to the number of phenomena for which it offers a satisfactory solution. The first experiment of M. Rameau is, that every sonorous body, together with its principal sound and its octave, gives likewise its twelfth and seventeenth major above; which being approximated as much as possible, even to the chords immediately represented by them, return to the third, fifth, and octave, or, in other words, produce perfect harmony. This is what nature, when solicited, spontaneously gives; this is what the human ear, unprepared and uncultivated, imbibes with ineffable avidity and pleasure. Could any thing which claims a

right to our attention, and acceptance from nature, be impressed with more genuine or more eligible signatures of her sanction than this? We do not contend for the truth of M. Rameau's second experiment. Nor is it necessary we should. The first, expanded and carried into all its consequences, resolves the phenomena of harmony in a manner sufficient to establish its authenticity and influence. The difficulties for which it affords no solution are too few and too trivial either to merit the regard of an artist, or a philosopher, as M. D'Alembert in his *Elements* has clearly shown. The facts with which M. Rousseau confronts this principle, the armies of multiplied harmonics generated in *infinitum*, which he draws up in formidable array against it, only show the thin partitions which sometimes may divide philosophy from whim. For, as bodies are infinitely divisible, according to the philosophy now established, or, as, according to every philosopher, they must be indefinitely divisible, each infinitesimal of any given mass, which are only harmonics to other principal sounds, must have fundamental tones and harmonics peculiar to themselves; so that, if the reasoning of Rousseau has any force against M. Rameau's experiment, the ear must be continually distracted with a chaos of inapprehensible harmonics, and melody itself must be lost in the confusion. But the truth of the matter is, that, by the wise institution of nature, there is such a conformity established between our senses and their proper objects, as must prevent all these disagreeable effects. Rousseau and his opponent are agreed in this, that the harmonics conspire to form one predominant sound; and are not to be detected but by the nicest organs, applied with the deepest attention. It is equally obvious, that, in an artificial harmony, by a proper management of this wise precaution of nature, dissonances themselves may be either entirely concealed or considerably softened. So that, since by nature sonorous bodies in actual vibration are predisposed to exhibit perfect harmony; and since the human ear is, by the same wise regulation, fabricated in such a manner as to perceive it; the harmonical chaos of M. Rousseau must have exclusively operated on his own brain, where indeed it met probably with the warmest reception. Nor has it availed him to pretend, that before the harmonics can be distinguished, sonorous bodies must be impelled with a force which alters the chords, and destroys the purity of the harmony; for this position is equally false both in theory and practice. In theory, because an impulse, however forcible, must proportionally operate on all the parts of any sonorous body, so far as it extends: in practice, because the human ear actually perceives the harmony to be pure. What effects his various manœuvres upon the organ may have, we leave to such as have leisure and curiosity enough to try the experiments: but it is apprehended, that when tried, their results will leave the system of Rameau, particularly as remodelled by D'Alembert, in its full force.

Of all the whims and paradoxes maintained by this great philosopher, none is more extravagant than his assertion, that every chord, except the simple unison, is displeasing to the human ear: nay, that we are only reconciled to octaves themselves, by being inured to hear them from our infancy. Strange, that nature should have fixed this invariable proportion between male and female voices, whilst at the same time she inspired the hearers with such violent prepossessions against it as were invincible but by long and confirmed habit! The translator of *D'Alembert's Elements* has been at peculiar pains to investigate his earliest recollections upon this subject; and has had such opportunities, both of attending to his original perceptions, and of recognizing the fidelity of his memory, as are not common. He can remember, even from a period of early childhood, to have been pleased with the simplest kinds of artificial harmony; to have distinguished the harmonics of sonorous bodies with delight; and to have been struck with horror at the sound of such

bodies as, by their structure, or by the cohesion of their parts, exhibited these harmonics false. This is the chief, if not the only cause, of the tremendous and disagreeable sensation which we feel from the sound of the Chinese gong. The same horrible cacophony is frequently, in some degree, produced by a drum unequally braced: from this sound the translator often remembers to have started and screamed, when carried through the streets of the town in which he was borne in the arms of his nursery-maid; and as he is conscious, that the acoustic organs of many are as exquisite as his own, he cannot doubt but they may have had the same sensations, though perhaps they do not recollect the facts. So early and so nicely may the sensations of harmony and discord be distinguished. But after all, it seems that harmony is no more than a modern invention, and even at this late period only known to the Europeans. We should, however, be glad to know, from what oracle our philosopher learned that harmony was not known to antiquity; since, from what remains of their works, no proof of his position can possibly be derived. But though Rousseau's mighty objections were granted, that harmony can only be endured by such ears as are habitually formed and cultivated; that the period of its prevalence has been short, and the extent of its empire limited to Europe; still his conclusion, that it is a Gothic and barbarous invention, is not fairly deducible even from these premises. Must we affirm, that epic poetry has no foundation in nature, because, during the long interval which happened from the beginning of the world to the destruction of Troy, no epic poem seems to have appeared? Or because a natural and mellifluous versification is less relished by an unpolished taste, than the uncouth rhymes of a common ballad, shall we infer, that the power of numbers is merely supposititious and arbitrary? On the contrary, we will venture to affirm, that though harmony cannot, as Rameau supposes, be mathematically demonstrated from the nature and vibrations of sonorous bodies; yet the idea of its constituent parts, and of their coalescence, is no less established, no less precise and definite, than any mode or property of space or quantity to be investigated by geometrical researches or algebraical calculations. It is certain, that the mimetic or imitative power of music chiefly consists in melody; but from this truth, however evident, it cannot be fairly deduced, that harmony is absolutely unsusceptible of imitation. Perhaps every musical sound, even to the most simple, and all modulations of sound, are more or less remotely connected with some sentiment or passion of the human heart. We know, that there are instinctive expressions of pain or pleasure in their various modes and degrees, which, when uttered by any sensitive, and perceived by any conscious being, excite in the mind of the percipient a feeling sympathetic with that by which they are prompted. We likewise know from experience, that all artificial sounds modulated in the same manner, have similar, though not equal, effects. We have seen, that, in order to render harmony compatible with itself, the melody of each part must be congenial; and, for that reason, one kindred melody result from the whole. So far, therefore, as any composer has it in his power to render the general melody homogeneous; so far the imitation may be preserved, and even heightened; for such objects as are majestic and august, or the feelings which they excite, are more aptly expressed by a composition of kindred sounds, than by any simple tone whatever. They who suppose the mimetic powers of music to be consummated in the imitation of mere unmeaning sounds or degrees of motion, must entertain limited and unworthy ideas of its province. It is naturally a representative almost of every sentiment or affection of the soul: and, when this end is gained, the art must have reached its highest perfection, and produced its noblest effects. But these effects, however sensible among the ancients, may in us be superseded by other causes which remain yet unexplored. Theatrical per-

formances are likewise, by them, said to have produced the most wonderful effects; yet these we do not recognise amongst ourselves, though we have dramatic entertainments perhaps not inferior to theirs — M. Rousseau proceeds to tell us, that among the ancients the *enharmonic* species of music was sometimes called *harmony*.

Direct HARMONY, is that in which the bass is fundamental, and in which the upper parts preserve among themselves, and with that fundamental bass, the natural and original order which ought to subsist in each of the chords that compose this harmony.

Inverted HARMONY, is that in which the fundamental or generating sound is placed in some of the upper parts, and when some other sound of the chord is transferred to the bass beneath the others.

HARMONY of the Spheres, or *Celestial harmony*, a sort of music much talked of by many of the ancient philosophers and fathers, supposed to be produced by the sweetly tuned motions of the stars and planets. This harmony they attributed to the various proportionate impressions of the heavenly globes upon one another, acting at proper intervals. It is impossible, according to them, that such prodigious large bodies, moving with so much rapidity, should be silent: on the contrary, the atmosphere, continually impelled by them, must yield a set of sounds proportionate to the impression it receives; consequently, as they do not all run the same circuit, nor with one and the same velocity, the different tones arising from the diversity of motions, directed by the hand of the Almighty, must form an admirable symphony or concert. They therefore supposed, that the moon, as being the lowest of the planets, corresponded to *mi*; Mercury, to *fa*; Venus, to *sol*; the Sun, to *la*; Mars, to *si*; Jupiter, to *ut*; Saturn, to *re*; and the orb of the fixed stars, as being the highest of all, to *mi*, or the octave.

HARMOSTES, or HARMOSTA, in antiquity, a sort of magistrate among the Spartans, whereof there were several, whose business was to look to the building of citadels, and repairing the forts and fortifications of the cities. The word is ἁρμοστής, formed of ἁρμοζω, *apto, concino*, "I adapt, concert," &c.

HARMOSYNIANS, ἁρμοσυνοί, in antiquity, were magistrates among the Spartans, who, after the death of Lycurgus, were appointed to enforce the observance of that law of the Spartan legislator which required married women to wear a veil when they appeared in the streets, whereby they were distinguished from single females, who were allowed to appear abroad with their faces uncovered.

HARNESS, a complete armour, or the whole equipage and accoutrements of a cavalier heavily armed; as casque, cuirass, &c. The word is formed of the French *harnois*; which some derive from the Greek ἀρνίς, "a lamb's skin," because they anciently covered themselves therewith. Du Cange observes, that the word *harnesium* is used in the corrupt Latin in the same sense, and that it comes from the High Dutch *barnas* or *barnisch*. Others derive it from the Italian *arnese*; others from the Celtic *barnes*, "a cuirass." Under king Richard II. it was expressly forbidden all men to ride in harness with lances. *Vide* stat. 7 Ric. II. cap. 13. In the statute 2 Hen. VI. cap. 14. harness seems to include all kinds of furniture for offence as well as defence, both of men and horse; as swords, buckles for belts, girdles, &c.

HARNESS is also used for the furniture put on a horse to draw in a coach or waggon, or other carriage; such as collars, leathers, traces, &c.

HARO, HAROU, or *Harol*, in the Norman customs, *Clamour de baro* is a cry or formula of invoking the assistance of justice against the violence of some offender, who, upon hearing the word *baro*, is obliged to desist, on pain of being severely punished for his outrage, and to go with the party before the

judge. The word is commonly derived of *ba* and *rout*, as being supposed an invocation of the sovereign power, to assist the weak against the strong, on occasion of Raoul first duke of Normandy, about the year 912, who rendered himself venerable to his subjects by the severity of his justice; so that they called on him even after his death when they suffered any oppression. Some derive it from Harola king of Denmark, who in the year 826 was made grand conservator of justice at Mentz. Others from the Danish *aa rau*, q. d. "help me;" a cry raised by the Normans in flying from a king of Denmark named Roux, who made himself duke of Normandy. The letters of the French chancery have usually this clause, *Non obstant clamor de baro*, &c. The haro had anciently such vast power, that a poor man of the city of Caen named Aslelin, in virtue hereof, arrested the corpse of William the Conqueror, in the middle of the funeral procession, till such time as his son Henry had paid the value of the land in question, which was that whereon the chapel was built wherein he was interred.

HARP, a musical instrument of the stringed kind, of a triangular figure, and held upright between the legs of the performer. Papias, and Du Cange after him, will have the harp to have taken its name from the Arpi, a people of Italy, who were supposed the first that invented it; and from whom, they say, it was borrowed by other nations. Menage, &c. derive the word from the Latin *barpa*, and that from the German *berp* or *barp*. Others bring it from the Latin *carpo*, because touched or thrummed with the fingers. Dr. Hickes derives it from *barpa* or *bearpa*, which signify the same thing; the first in the language of the Cimbri, the second in that of the Anglo-Saxons. The English priest who wrote the life of St. Dunstan, and who lived with him in the tenth century, says, cap. ii. n. 12. *Sumpsit secum ex more citbaram suam, quam paterna lingua hearpan vocamus*; which intimates the word to be Anglo-Saxon.

The harp was the favourite musical instrument of the Britons and other northern nations in the middle ages; as is evident from their laws, and from every passage in their history, in which there is the least allusion to music. By the laws of Wales, a harp was one of the three things that were necessary to constitute a gentleman, i. e. a freeman; and none could pretend to that character who had not one of these favourite instruments, or could not play upon it. By the same laws, to prevent slaves from pretending to be gentlemen, it was expressly forbidden to teach, or to permit them to play upon the harp; and none but the king, the king's musicians, and gentlemen, were allowed to have harps in their possession. A gentleman's harp was not liable to be seized for debt; because the want of it would have degraded him from his rank, and reduced him to a slave. The harp was in no less estimation and universal use among the Saxons and Danes. Those who played upon this instrument were declared gentlemen by law; their persons were esteemed inviolable, and secured from injuries by very severe penalties; they were readily admitted into the highest company, and treated with distinguished marks of respect wherever they appeared.

There is some diversity in the structure of harps. That called the *triple harp* has 97 strings or chords in three rows, extending from C in the tenor clef to double G in alt, which make five octaves: the middle row is for the semitones, and the two outside rows are perfect unisons. On the bass side, which is played with the right hand, there are 36 strings; on the treble side, 26; and in the middle row, 35 strings. There are two rows of pins or screws on the right side, serving to keep the strings tight in their holes, which are fastened at the other end to three rows of pins on the upper side. The harp, within the last 40 years, has been in some degree improved by the addition of eight strings to the unison, viz. from E to double F in alt. This

instrument is struck with the finger and thumb of both hands. Its music is much like that of the spinet, all its strings going from semitone to semitone; whence some call it an *inverted spinet*. It is capable of a much greater degree of perfection than the lute.

There are among us two sorts of this instrument, viz. the *Welsh harp*, being that just described; and the *Irish harp*. Plate 3. fig. 1. represents the harp of Brian Boiromh, king of all Ireland, slain in battle with the Danes A. D. 1014, at Clontarf. His son Donagh having murdered his brother Teige, A. D. 1023, and being deposed by his nephew, retired to Rome, and carried with him the crown, harp, and other regalia of his father, which he presented to the Pope in order to obtain absolution. Adrian IV. surnamed Breakspear, alleged this circumstance as one of the principal titles he claimed to this kingdom in his bull transferring it to Henry II. These regalia were kept in the Vatican till the Pope sent the harp to Henry VIII. with the title of Defender of the Faith; but kept the crown, which was of massive gold. Henry gave the harp to the first earl of Clanricard; in whose family it remained till the beginning of this century, when it came by a lady of the De Burgh family into that of Mac Mahon of Clenagh in the county of Clare, after whose death it passed into the possession of commissioner Mac Namara of Limerick. In 1782 it was presented to the right honourable William Conyngham, who deposited it in Trinity college library. It is 32 inches high, and of extraordinary good workmanship; the sounding-board is of oak, the arms of red sally; the extremity of the uppermost arm in part is capped with silver, extremely well wrought and chiseled. It contains a large crystal set in silver, and under it was another stone now lost. The buttons or ornamental knobs at the sides of this arm are of silver. On the front arm are the arms chased in silver of the O'Brien family, the bloody-hand supported by lions. On the sides of the front arm within two circles are two Irish wolf dogs cut in the wood. The holes of the sounding-board where the strings entered are neatly ornamented with escutcheons of brass carved and gilt; the larger sounding-holes have been ornamented, probably with silver, as they have been the object of theft. This harp has 28 keys, and as many string-holes, consequently there were as many strings. The foot piece or rest is broken off, and the parts round which it was joined are very rotten. The whole bears evidence of an expert artist.

King David is usually painted with a harp in his hands; but we have no testimony in all antiquity that the Hebrew harp, which they call *chinnor*, was any thing like ours. On a Hebrew medal of Simon Maccabæus we see two sorts of musical instruments; but they are both of them very different from our harp, and only consist of three or four strings. All authors agree, that our harp is very different from the lyra, cithara, or barbiton, used among the Romans. Fortunatus, lib. vii. carm. 8. witnesses, that it was an instrument of the barbarians:

*Romanique lyra, plaudat tibi barbarus harpa,
Græcus Achilliacha, crotta Britanna canat.*

Of ancient harps, two are represented on the same plate. Fig. 2. is a *trigonum* or triangular harp. It is taken from an ancient painting in the museum of the king of Naples, in which it is placed on the shoulder of a little dancing Cupid, who supports the instrument with his left hand, and plays upon it with his right. The trigonum is mentioned by Athenæus, lib. iv. and by Julius Pollux, lib. iv. cap. 9. According to Athenæus, Sophocles calls it a *Phrygian instrument*; and one of his disciples tells us, that a certain musician, named *Alexander Alexandrinus*, was such an admirable performer upon it, and had given such proofs of his abilities at Rome, that he made the inhabitants *μουσικαῖον*, "musically mad." Fig. 3. and 4. are va-

rieties of the same instrument. Fig. 5. is the Theban harp, according to a drawing made from an ancient painting in one of the sepulchral grottos of the first kings of Thebes, and communicated by Mr. Bruce to Dr. Burney. (Hist. of Music, p. 224.) The performer is clad in a habit made like a shirt, such as the women still wear in Abyssinia, and the men in Nubia. It reaches down to his ancles; his feet are without sandals, and bare; his neck and arms are also bare; his loose white sleeves are gathered above his elbows; and his head is close shaved. His left hand seems employed in the upper part of the instrument among the notes in *alto*, as if in an arpeggio; while, stooping forwards, he seems with his right hand to be beginning with the lowest string, and promising to ascend with the most rapid execution: this action, so obviously rendered by an indifferent artist, shows that it was a common one in his time; or, in other words, that great hands were then frequent, and consequently that music was well understood and diligently followed.

On this instrument Dr. Burney makes the following observations: "The number of strings, the size and form of this instrument, and the elegance of its ornaments, awaken reflections, which to indulge would lead us too far from our purpose, and indeed out of our depth. The mind is wholly lost in the immense antiquity of the painting in which it is represented. Indeed the time when it was executed is so remote, as to encourage a belief, that arts, after having been brought to great perfection, were again lost and again invented long after this period. —With respect to the number of strings upon this harp, if conjectures may be allowed concerning the method of tuning them, two might be offered to the reader's choice. The first idea that presented itself at the sight of 13 strings was, that they would furnish all the semitones to be found in modern instruments within the compass of an octave, as from C to c, D to d, or E to e. The second idea is more Grecian, and conformable to antiquity; which is, that if the longest string represented *proslambanomenos*, or D, the remaining 12 strings would supply all the tones, semitones, and quarter tones of the diatonic, chromatic, and enharmonic genera of the ancients, within the compass of an octave: but for my part, I would rather incline to the first arrangement, as it is more natural, and more conformable to the structure of our organs, than the second. For, with respect to the genera of the Greeks, though no historic testimony can be produced concerning the invention of the diatonic and chromatic, yet ancient writers are unanimous in ascribing to Olympus the Phrygian the first use of the enharmonic: and though in the beginning the melody of this genus was so simple and natural as to resemble the wild notes and rude essays of a people not quite emerged from barbarism; yet, in after-times, it became overcharged with finical fopperies and fanciful beauties, arising from such minute divisions of the scale as had no other merit than the great difficulty of forming them. It seems a matter of great wonder, with such a model before their eyes as the Theban harp, that the form and manner of using such an instrument should not have been perpetuated by posterity; but that, many ages after, another of an inferior kind, with fewer strings, should take place of it. Yet if we consider how little we are acquainted with the use and even construction of the instruments which afforded the greatest delight to the Greeks and Romans, or even with others in common use in a neighbouring part of Europe only a few centuries ago, our wonder will cease; especially if we reflect upon the ignorance and barbarism into which it is possible for an ingenious people to be plunged by the tyranny and devastation of a powerful and cruel invader.

Bell HARP, a musical instrument of the string kind, thus called from the common players on it swinging it about, as a bell on its basis. It is about three feet long; its strings, which

are of no determinate number, are of brass or steel wire, fixed at one end, and stretched across the sound-board by screws fixed at the other. It takes in four octaves, according to the number of the strings, which are struck only with the thumbs, the right hand playing the treble, and the left hand the base: and in order to draw the sound the clearer, the thumbs are armed with a little wire pin. This may perhaps be the lyra, or cythara of the ancients; but we find no mention made of it under the name it now bears, which must be allowed to be modern.

HARP of Æolus. See ACOUSTICS, p. 25.

HARPAGINES, in antiquity, were hooks of iron, hanging on the top of a pole, which, being secured with chains to the masts of ships, and then let down with great velocity into the enemy's vessels, caught them up into the air. By way of defence against these machines, they covered their ships with hides, which broke and blunted the force of the iron. The harpagines, by the Greeks called *Ἀρπαγε*, owe their invention to Anacharsis the Scythian philosopher.

HARPALUS, a Greek astronomer, who flourished about 480 B. C. corrected the cycle of eight years invented by Cleostratus; and proposed a new one of nine years, in which he imagined the sun and moon returned to the same point. But Harpalus's cycle was afterwards altered by Meton, who added ten full years to it.

HARPIES (*Ἀπιτῖαι*, *HARPIÆ*), in antiquity, a rapacious impure sort of monsters of the bird kind, mentioned among the poets. They are represented (Virg. *Æn.* iii.) with wings, ears like bears, bodies like vultures, faces like women, and feet and hands hooked like the talons of birds of prey. The ancients looked on the harpies as a sort of genii or demons. Some make them the daughters of Tellus and Oceanus, the *earth* and *ocean*; whence, says Servius, it is, that they inhabit an island, half on land and half in water. Valerius Flaccus makes them the daughters of Typhon.

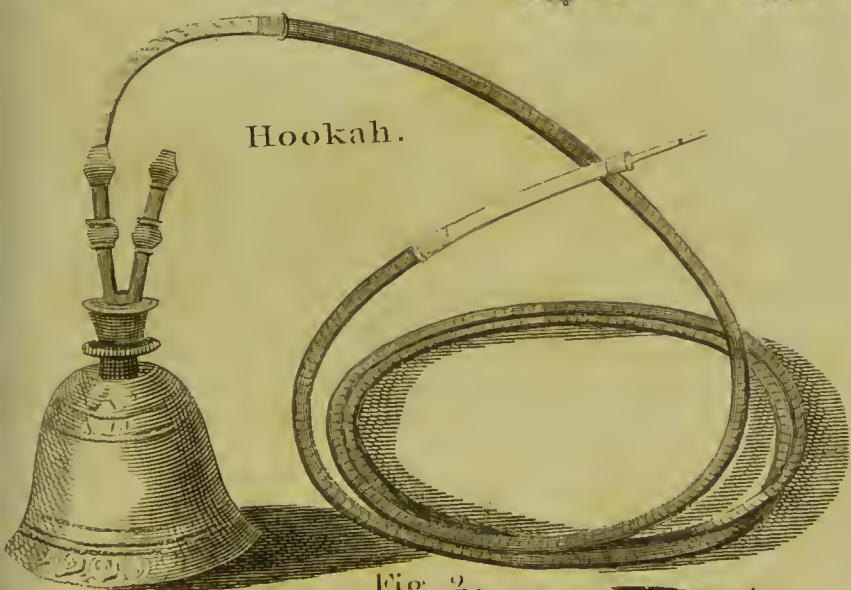
There were three harpies, Aello, Ocypete, and Celæno, which last Homer calls *Podarge*. Hesiod, in his *Theogony*, ver. 267. only reckons two, Aello and Ocypete, and makes them the daughters of Thaumas and Electra, affirming that they had wings, and went with the rapidity of the wind. Zephyrus begat of them Balaus and Xanthus, Achilles's horses. Pherecydes relates, that the Boreades expelled them from the Ægean and Sicilian seas, and pursued them as far as the islands which he calls *Plotæ* and Homer *Calynæ*; and which have since been called the *Strophades*. Vossius, *De Idolol.* lib. iii. cap. 99. p. 63. thinks, that what the ancients have related of the harpies, agrees to no other birds so well as the bats found in the territories of Darien in South America. These animals kill not only birds, but dogs and cats, and prove very troublesome to men by their peckings. But the ancients, as the same Vossius observes, knew nothing of these birds. By the harpies, therefore, he thinks, they could mean nothing else but the winds; and that it was on this account they were made daughters of Electra, the daughter of Oceanus. Such is the opinion of the scholiasts of Apollonius, Hesiod, and Eustathius. Their names, Aello, Ocypete, Celæno, are supposed to suggest a farther argument of this.

Mr. Bryant supposes that the harpies were a college of priests in Bithynia, who, on account of their repeated acts of violence and cruelty, were driven out of the country: their temple was called *Arpi*, and the environs *Arpiai*, whence the Grecians formed *Ἀρπυιαι*; and he observes farther, that *Harpia*, *Ἀρπυια*, was certainly of old the name of a place.

HARPINGS, the fore-parts of the wales which encompass the bow of a ship, and are fastened to the stem, being thicker than the after part of the wales, in order to reinforce the ship in this place, where she sustains the greatest shock of resistance



Hippopotamus.



Hookah.

Fig. 2.

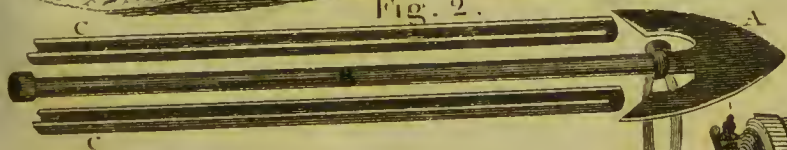
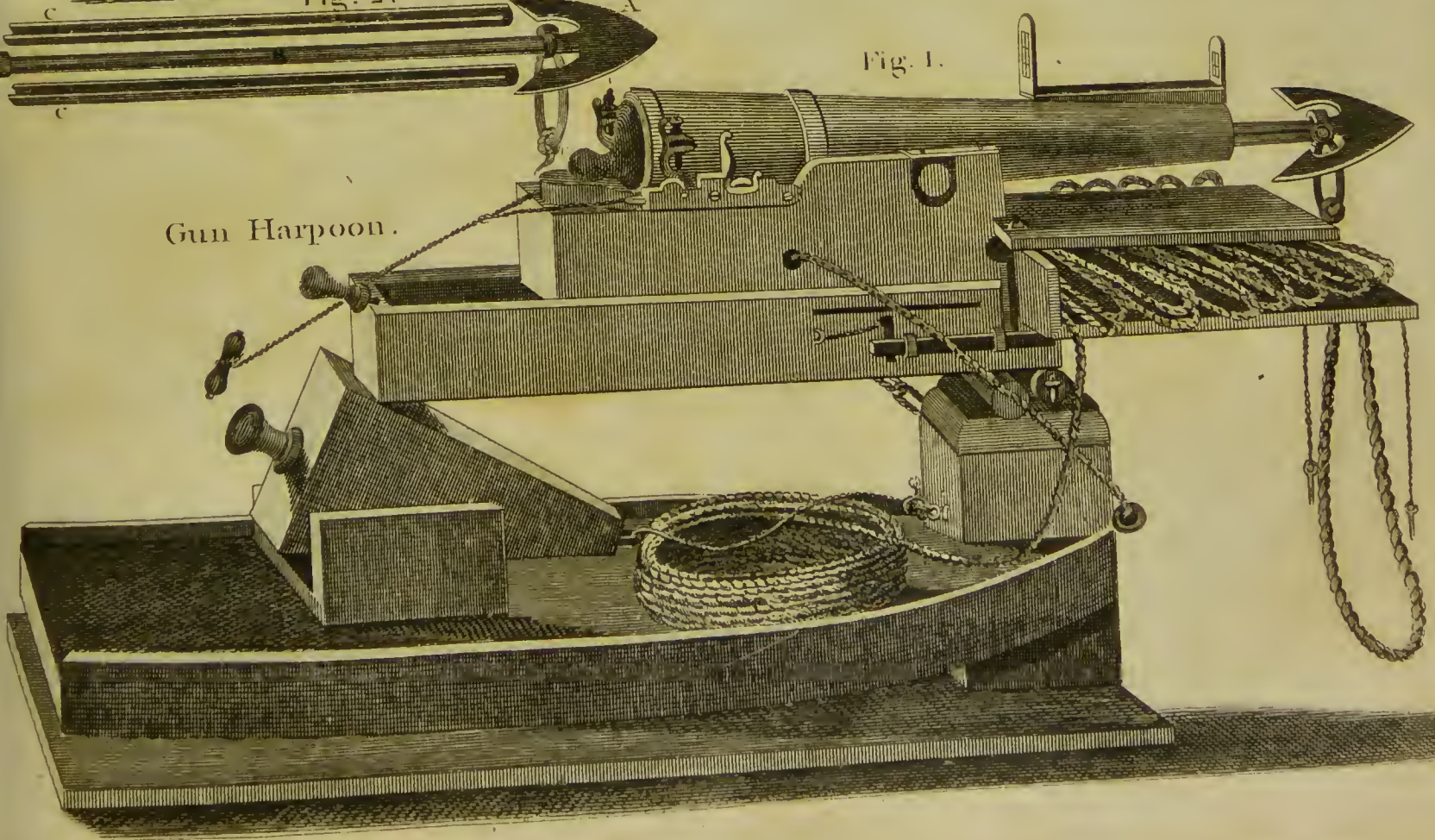


Fig. 1.

Gun Harpoon.



in plunging into the sea, or dividing it, under a great pressure of sail.

HARPOCRATES, in mythology, the son of Isis and Osiris. This is an Egyptian deity, whose distinguishing attribute is, that he is represented with his fingers applied to his mouth, denoting that he is the god of silence. The statue of this idol was fixed in the entrance of most of the Egyptian temples, and he was commonly exhibited under the figure of a young man naked, crowned with an Egyptian mitre, holding in one hand a cornucopia, and in the other the flower of lotus, and sometimes bearing a quiver.

HARPOCRATION (Valerius), a celebrated ancient rhetorician of Alexandria, who has left us an excellent *Lexicon upon the ten orators of Greece*. Aldus first published this lexicon in the Greek at Venice in 1613. Many learned men have laboured upon it; but the best edition was given by James Gronovius at Leyden in 1696.

HARPOON, or **HARPING-IRON**, a spear or javelin used to strike the whales in the Greenland fishery. The harpoon, which is sometimes called the *harping-iron*, is furnished with a long staff, having at one end a broad and flat triangular head, sharpened at both edges, so as to penetrate the whale with facility: to the head of this weapon is fastened a long cord, called the *whale line*, which lies carefully coiled in the boat, in such a manner as to run out without being interrupted or entangled. See **BALÆNA**, *Whale-Fishery*, and pl. 4.

Gun-HARPOON, a kind of fire-arm for discharging harpoons at whales, and thereby killing them more easily and expeditiously than formerly when the harpoons were thrown by the hand. Though this method was projected a good many years ago, it has but lately come into use; and premiums have been annually offered by the society for encouraging arts, &c. to the persons who first struck a fish in this manner. In the Transactions of that Society for 1786, we have an account of the first fish struck in this manner in 1784. The gun was of the blunderbuss construction, loaded with four common tobacco-pipes full of glazed powder; the fish was shot at the distance of ten fathoms, the harpoon going into her back up to the ring; and she was killed in about an hour. In 1785 three whales were killed in this manner: four in 1786, and three in 1787. Since that time the gun harpoon has come more into use, and will probably soon supersede the other method entirely. In the Transactions of the Society for 1789, we have accounts of a number of whales killed in this manner. The instrument appears to be extremely useful in calm still weather, as the whale, though a timorous creature, will frequently allow a boat to approach it to the distance of 20, 15, or even 10 fathoms, all of which distances are within reach of the gun harpoon, though not within the reach of that thrown by the hand. The greatest inconvenience was in case of rain or snow, by which the lock was apt to get wet. To remedy this, a case of leather was made to fit round the gun and over the lock, lined with tin, and big enough to fire the gun when it was on. The fish struck with an harpoon discharged in this manner are soon killed by reason of its penetrating their bodies to a great depth, not less than five or six feet, which no man's strength would be able to accomplish. In the volume just quoted, we have an account of one which was shot through the tail. The harpoon broke in the slit, but five fathoms of line went through the tail. The fish was killed in eight hours, which is perhaps the only instance of a fish struck in that part being caught. In another, the harpoon carried six feet of line into its body; the creature died in ten minutes. Others were killed in 15 minutes or half an hour, and one had a rib broken by the violence of the stroke. In the Transactions of the Society for 1790, there are other accounts similar to the foregoing, and all agreeing as to the great usefulness of the instrument both for striking the fish at

a considerable distance, and for killing them in a very short time. See pl. 4.

HARPSICORD, the most harmonious of all the musical instruments of the string-kind. It is played on after the manner of the organ, and is furnished with a set, and sometimes with two sets of keys; the touching or striking of these keys moves a kind of little jacks, which also move a double row of chords or strings, of brass or iron, stretched over four bridges on the table of the instrument.

HARQUEBUSS, a piece of fire-arms, of the length of a musket, usually cocked with a wheel. It carried a ball that weighed one ounce seven-eighths.

There was also a larger sort, called the great harquebuss, used for the defence of strong places, which carried a ball of about three ounces and a half: but they are now but little used, except in some old castles, and by the French in some of their garisons.

HARRIER, a kind of hound, endowed with an admirable gift of smelling, and very bold in the pursuit of his game. See **CANIS**.

HARRINGTON (Sir John), an ingenious English poet, was the son of John Harrington, Esq. who was committed to the Tower by queen Mary for holding a correspondence with her sister Elizabeth; who, when she came to the crown, stood godmother to this son. Before he was 30, he published a translation of Ariosto's Orlando Furioso, a work by which he was principally known; for though he afterwards published some epigrams, his talent did not seem to have lain that way. He was created knight of the bath by James I.; and presented a MS. to prince Henry, levelled chiefly at the married bishops. He is supposed to have died about the latter end of James's reign.

HARRINGTON (James), a most eminent English writer in the 17th century, bred at Oxford, travelled into Holland, France, Denmark, and Germany, and learned the languages of those countries. Upon his return to England, he was admitted one of the privy-chamber extraordinary to king Charles I. He served the king with great fidelity, and made use of his interest with his friends in parliament to procure matters to be accommodated with all parties. The king loved his company, except when the conversation happened to turn upon commonwealths. He found means to see the king at St. James's; and attended him on the scaffold, where, or a little before, he received a token of his majesty's affection. After the death of king Charles, he wrote his *Oceana*; a kind of political romance, in imitation of Plato's Commonwealth, which he dedicated to Oliver Cromwell. It is said, that when Oliver perused it, he declared, that "the gentleman had wrote very well, but must not think to cheat him out of his power and authority; for that what he had won by the sword, he would not suffer himself to be scribbled out of." This work was attacked by several writers, against whom he defended it. Beside his writings to promote republican principles, he instituted likewise a nightly meeting of several ingenious men in the New Palace-Yard, Westminster; which club was called the *Rota*, and continued till the secluded members of parliament were restored by general Monk. In 1661 he was committed to the Tower for treasonable designs and practices; and chancellor Hyde, at a conference with the lords and commons, charged him with being concerned in a plot. But a committee of lords and commons could make nothing of that plot. He was conveyed to St. Nicolas's island, and from thence to Plymouth, where he fell into an uncommon disorder of the imagination. Having obtained his liberty by means of the earl of Bath, he was carried to London, and died in 1677. He published, besides the above works, several others, which were first collected by Toland, in one volume folio, in 1700; but a more complete edition was published, in 1737, by the reverend Dr. Birch.

HARRIOT (Thomas), a celebrated algebraist, was born at Oxford in 1560, where he was also educated. In 1579 he completed his bachelor's degree; and, being already distinguished for his mathematical learning, was soon after recommended to Sir Walter Raleigh as a proper person to instruct him in that science. He was accordingly received into the family of that gentleman; who, in 1585, sent him with the colony, under Sir Richard Grenville, to Virginia; of which country, having remained there about a year, he afterwards published a topographical description. About the year 1588 Mr. Harriot was introduced, by his patron Sir Walter Raleigh, to Henry Percy earl of Northumberland, who allowed him a pension of 120*l. per annum*. He spent many years of his life in Sion college; where he died in July 1621, of a cancer in his lip, and was buried in the church of St. Christopher, where a handsome monument was erected to his memory. Anthony Wood tells us, he was a deist, and that the divines looked upon his death as a judgment. Be his religious opinions what they might, he was doubtless one of the first mathematicians of the age in which he lived, and will always be remembered as the inventor of the present improved method of algebraical calculation. His improvements in algebra were adopted by Des Cartes, and for a considerable time imposed upon the French nation as his own invention; but the theft was at last detected, and exposed by Dr. Wallis, in his History of Algebra, where the reader will find our author's invention accurately specified. His works are, 1. A brief and true report of the new-found land of Virginia; of the commodities there found, and to be raised, &c. 2. *Artis analyticae praxis ad æquationes algebraicas nova expedita, et generali methodo resolvendas, e posthumis Thomæ Harrioti, &c.* 3. *Ephemeris chymometrica*, a manuscript, in the library of Sion college. He is said to have left several other manuscripts, which are probably lost.

HARRIS (James, Esq.), an English gentleman of very uncommon parts and learning; was the son of James Harris, Esq. by a sister of lord Shaftesbury author of *The Characteristics*. He was born in the Close at Salisbury 1709; and educated at the grammar-school there. In 1726 he was removed to Wadham college in Oxford, but took no degree. He cultivated letters, however, most attentively; and also music, in the theory and practice of which he is said to have had few equals. He was member for Christ-church Hants, which he represented in several successive parliaments. In 1763 he was appointed one of the lords commissioners of the admiralty, and soon after removed to the board of treasury. In 1774 he was made secretary and comptroller to the queen, which post he held until his death. He died Dec. 21, 1780, in his 72d year, after a long illness, which he bore with calmness and resignation.—He is the author of some valuable works. 1. *Three Treatises: concerning Art; Music, Painting, and Poetry; and Happiness*, 1745, 8vo. 2. *Hermes; or, A Philosophical Enquiry concerning Universal Grammar*. 3. *Philosophical Arrangements*. 4. *Philological Inquiries*, 1782, 2 vols. 8vo. finished just before his death, and published since. These *Inquiries* show much ingenuity and learning; but being the amusement of his old age rather than an exertion of genius, they have not the philosophic tone of his former productions.

HARRIS, one of the Hebrides or Western Islands of Scotland. It is 20 miles in length, and 10 in breadth. Upon the east side it is mostly rock; but on the west there are some tolerable farms, and the number of people amounts to 2000. It has Lewis on the north, and North Uist on the south, from which it is separated by a channel of four miles in width, called the *Sound of Harris*. This channel is navigable for vessels of burden, but it requires a skilful pilot. It is the only passage between the Butt of the Lewis and Bara for vessels of burden passing to and from the west side of the Long Island. The sound

is greatly incumbered with rocks and islands, some of which are considerable, as Bernera, Pabay, Enfay, Killegray. These, with Scalpay, Taranfay, and Scarp, compose the inhabited islands on the coast of Harris. Some of them produce good crops of grain, and all of them good pasture. Harris and its islands sell from 400 to 500 tons of kelp annually; it abounds on the east side in excellent lochs or bays, and its shores on both sides form one continued fishery. The fish on this coast, and along the whole shores of the Long Island, are more numerous, and of larger dimensions, than those on the opposite continent; on which account, two royal fishing stations were begun in the reign of Charles I. one in Loch Maddie, and the other in the Sound of Harris.

HARRISON (William), a writer much esteemed and patronised by the literati of his time, was fellow of New-college, Oxford, and had no other income than 40*l.* a year as tutor to one of the duke of Queensberry's sons. In this employment he fortunately attracted the favour of Dr. Swift, whose solicitations with Mr. St. John obtained for him the reputable employment of secretary to lord Raby, ambassador at the Hague, and afterwards earl of Strafford. A letter of his whilst at Utrecht, dated Dec. 16, 1712, is printed in the Dean's works. Mr. Harrison, who did not long enjoy his rising fortune, was dispatched to London with the Barrier-treaty; and died Feb. 15, 1712-13. See the Journal to Stella, of that and the following day; where Dr. Swift laments his loss with the most unaffected sincerity. Mr. Tickel has mentioned him with respect in his *Prospect of Peace*; in *English Poets*, vol. xxvi. p. 113; and Dr. Young in the beautiful close of an Epistle to Lord Lansdowne, vol. lii. p. 185, most pathetically bewails his loss. Dr. Birch, who has given a curious note on Mr. Harrison's Letter to Swift, has confounded him with Thomas Harrison, M. A. of Queen's-college. In Nichols's Select Collection are some pleasing specimens of his poetry; which, with Woodstock-Park in Doddsley's Collection, and an Ode to the Duke of Marlborough, 1707, in Duncombe's Horace, are all the poetical writings that are known of this excellent young man; who figured both as an humourist and a politician in the fifth volume of the Tatler, of which (under the patronage of Bolingbroke, Henley, and Swift) he was professedly the editor. See the Supplement to Swift. There was another William Harrison, author of *The Pilgrim*, or *The happy Convert*, a Pastoral Tragedy, 1709.

HARRISON (John), a most accurate mechanic, the celebrated inventor of the famous *time-keeper* for ascertaining the longitude at sea, and also of the compound, or, as it is commonly called, the *gridiron pendulum*; was born at Foulby, in the parish of Wragby, near Pontefract in Yorkshire, in 1693. The vigour of his natural abilities, if not even strengthened by the want of education, which confined his attention to few objects, at least amply compensated the deficiencies of it; as fully appeared from the astonishing progress he made in that branch of mechanics to which he devoted himself. His father was a carpenter, in which profession the son assisted; occasionally also, according to the miscellaneous practice of country artists, surveying land, and repairing clocks and watches. He was, from his early childhood, attached to any machinery moving by wheels, as appeared while he lay sick of the small-pox about the sixth year of his age, when he had a watch placed open upon his pillow to amuse himself by contemplating the movement. In 1700, he removed with his father to Barrow in Lincolnshire; where, though his opportunities of acquiring knowledge were very few, he eagerly improved every incident from which he might collect information; frequently employing all or great part of his nights in writing or drawing: and he always acknowledged his obligations to a clergyman who came every Sunday to officiate in the neighbourhood, who lent him a MS. copy of professor Saunderson's Lectures; which he carefully and

neatly transcribed, with all the diagrams. His native genius exerted itself superior to these solitary disadvantages; for in the year 1726 he had constructed two clocks, mostly of wood, in which he applied the escapement and compound pendulum of his own invention: these surpassed every thing then made, scarcely erring a second in a month. In 1728 he came up to London with the drawings of a machine for determining the longitude at sea, in expectation of being engaged to execute one by the board of longitude. Upon application to Dr. Halley, he referred him to Mr. George Graham; who, discovering he had uncommon merit, advised him to make his machine before he applied to the board of longitude. He returned home to perform this task; and in 1735 came to London again with his first machine; with which he was sent to Lisbon the next year for a trial of its properties. In this short voyage he corrected the dead reckoning about a degree and a half; a success that proved the means of his receiving both public and private encouragement. About the year 1739 he completed his second machine, of a construction much more simple than the former, and which answered much better; this, though not sent to sea, recommended Mr. Harrison yet stronger to the patronage of his private friends and of the public. His third machine, which he produced in 1749, was still less complicated than the second, and superior in accuracy, as erring only three or four seconds in a week. This he conceived to be the *ne plus ultra* of his attempts; but in an endeavour to improve pocket-watches, he found the principles he applied to surpass his expectations so much, as to encourage him to make his fourth time-keeper, which is in the form of a pocket watch, about six inches diameter. With this time-keeper his son made two voyages, the one to Jamaica, and the other to Barbadoes: in both which experiments it corrected the longitude within the nearest limits required by the act of the 12th of queen Anne; and the inventor therefore, at different times, though not without infinite trouble, received the proposed reward of 20,000*l*. These four machines were given up to the board of longitude. The three former were not of any use, as all the advantages gained by making them were comprehended in the last; they were worthy, however, of being carefully preserved as mechanical curiosities, in which might be traced the gradations of ingenuity combined with the most delicate workmanship; whereas they now lie totally neglected in the royal observatory at Greenwich. The fourth machine, emphatically distinguished by the name of *The time-keeper*, has been copied by the ingenious Mr. KENDAL; and that duplicate, during a three years' circumnavigation of the globe in the southern hemisphere by captain Cook, answered as well as the original. The latter part of Mr. Harrison's life was employed in making a fifth improved time-keeper on the same principles with the preceding one; which, at the end of a ten weeks' trial, in 1772, at the king's private observatory at Richmond, erred only $4\frac{1}{4}$ seconds. Within a few years of his death, his constitution visibly declined; and after frequent fits of the gout, a disorder that never attacked him before his 77th year, he died at his house in Red-Lion Square, in 1776, aged 83. The reclusé manner of his life in the unremitted pursuit of his favourite object, was by no means calculated to qualify him as a man of the world; and the many discouragements he encountered in soliciting the legal reward of his labours, still less disposed him to accommodate himself to the humours of mankind. In conversing on his profession, he was clear, distinct, and modest; yet, like many other mere mechanics, found a difficulty in delivering his meaning by writing; in which he adhered to a peculiar and uncouth phraseology. This was but too evident in his *Description concerning such mechanism as will afford a nice or true mensuration of time*, &c. 8vo. 1775; which his well-known mechanical talents will induce the public to ac-

count for from his unacquaintance with letters, from his advanced age, and attendant mental infirmities; among which may be reckoned his obstinate refusal to accept of any assistance whatever in this publication. This small work includes also an account of his new musical scale; or mechanical division of the octave, according to the proportion which the radius and diameter of a circle have respectively to the circumference. He had in his youth been the leader of a distinguished band of church-singers, had a very delicate ear for music; and his experiments on sound, with a most curious monochord of his own improvement, are reported to have been not less accurate than those he was engaged in for the mensuration of time.

HARROGATE, a village in the West Riding of Yorkshire, in the parish of Knaresborough, 206 miles from London, remarkable for its medicinal springs. These are three in number, all different in their qualities, notwithstanding their contiguity. 1. *The Tetter water* or Sweet Spa, a vitriolic spring of a sort of milky taste used in gravelly cases, was discovered by Mr. Slingby 1638. 2. *The stinking or sulphur spring*, useful in dropical, scorbutic, and gouty cases, rises in the town, and is received into four basins, under four different buildings; at one it is drunk, at the others used for hot or cold baths. It is perfectly clear; but the taste and smell a composition of rotten eggs, sea-water, and sulphur, and extremely salt. Bathing is the most general mode of using it. It is the strongest sulphur water in Great Britain; and from the superior strength of the impregnating sulphur, it does not lose the sulphureous smell even when exposed to a scalding and almost boiling heat; and in distilling it, when three pints had been taken off from a gallon of it, the last was as strong as the first, and stunk intolerably. It is discutient and attenuating, and a warm bath of it is of great benefit in pains and aches, strains and lameness; dissolving hard swellings, helping old ulcers and scrophulous complaints, and is a powerful cleanser of the stomach and bowels. 3. *St. Mungo's well*, is so called from Kentigern a Scotch saint much honoured hereabouts, whom his tutor Servanus bishop of Orkney, out of affection for him, called *Mongab*, which in the Norish or Norway language signifies a dear friend. The Harrogate season is from May to Michaelmas; and the company assemble and lodge in five or six large houses or inns on the heath, a mile from the village, each house having a long room and an ordinary: the best company used to lodge at Knaresborough, which is three miles off.

HARROW-ON-THE-HILL, a town of Middlesex, so called from its situation on the highest hill in the county, is 10 miles north-west of London. This parish is noted for a free school, founded in the reign of queen Elizabeth. A silver arrow is shot for here once a year, viz. August 4, by a select number of the scholars, who are dressed for the purpose in the habit of archers.

HARROW, in agriculture. See HUSBANDRY.

HART, a stag, or male deer, in the sixth year. See CERVUS.

HART-Beest, or Quanga. See CAPRA.

HART'S-Horns, the horns of the common male deer. The scrapings or raspings of the horn of this animal are medicinal, and used in decoctions, ptisans, &c. Hartshorn jelly is nutritive and strengthening, and is sometimes given in diarrheas; but a decoction of burnt hartshorn in water is more frequently used for this purpose, and is called *barshorn drink*. The coal of hartshorn, by being calcined with a long-continued and strong fire, is changed into a very white earth, till of late called *calcined barshorn*. This earth levigated is the basis of Sydenham's white decoction, which is commonly prescribed in dysenteries. When levigated, it is employed as an absorbent. The salt of hartshorn is a great sudorific, and given in fevers with success; and hartshorn also yields, by distillation, a very

penetrating volatile spirit. The chemical properties of the deer's horn, however, yields none of these in greater perfection than may be procured from the horns, or even the bones, of any other animal.

HARTLAND, a town in Devonshire, with a market on Saturday. It is seated on the Bristol Channel, near a promontory, called Hartland-point, 28 miles W. of Barnstaple, and 213 W. by S. of London. Lon. 4. 31. W. Lat. 51. 12. N.

HARTLEPOOL, a seaport of the county of Durham, with a market on Monday. It is commodiously seated on the sea-shore, and is partly surrounded by rocks and hills. It is a pretty large place, but the market is come to nothing. It is 16 miles S. E. of Durham, and 254 N. by W. of London. Lon. 1. 4. W. Lat. 54. 47. N.

HARTLEY, a town of Northumberland, on the coast, situated north west of Tynemouth, where Lord Delaval has constructed a pretty haven, whence coals are shipped for London. Here are large salt-works and copperas-works, and likewise considerable glass-works; and there is here a canal cut through a solid rock to the harbour, 52 feet deep, 30 broad, and 900 long. These works are the sole property of Lord Delaval, and yield a revenue of above 20,000*l. per annum*.

HARTLEY (David), M. A. born at Ilingworth, where his father was curate, received his academical education at Jesus college, Cambridge, of which he was a fellow. He first began to practise physic at Newark, in Nottinghamshire; from whence he removed to St Edmund's Bury, in Suffolk. After this, he settled for some time in London; and lastly went to live at Bath, where he died in 1757, aged 53, leaving two sons and a daughter. He published "A view of the present evidence for and against Mrs. Stephens's medicine as a solvent for the stone, containing 155 cases, with some experiments and observations;" London, 1739. He is said to have also written against Dr. Warren, of St. Edmund's Bury, in defence of inoculation; and some letters of his are to be met with in the Philosophical Transactions. The doctor was certainly a man of learning, and reputed a good physician; but too fond of nostrums. But his most considerable literary production is a work intitled, "Observations on man, his frame, his duty, and his expectations, in two parts;" London, 1749, 2 vols. 8vo. The first part contains observations on the frame of the human body and mind, and on their mutual connections and influences. The second part contains observations on the duty and expectations of mankind.

HARTMANN (John Adolphus), a learned divine and historian, was born at Munster in 1680. After being a Jesuit for several years, he became a Calvinist at Cassel, in 1715; and soon after was made a professor of philosophy and poetry, and in 1722 professor of history and eloquence, at Marburg, where he died in 1744. The most esteemed of his works are, 1. The state of the sciences at Hesse, in Germany. 2. *Historia Hassiaca*, 3 vols. 3. *Præcepta eloquentiæ rationalis*, &c.—He ought not to be confounded with *George Hartmann*, a German mathematician, who, in 1540, wrote a book on perspective; nor with *Wolfgang Hartmann*, who, in 1596, composed the Annals of Augsburg.

HARTOGIA, in botany; a genus of the pentandria order, belonging to the monœcia class of plants; and in the natural method ranking under the 48th order, *Aggregatæ*. The male calyx is pentaphyllous, the petals five; the female calyx triphyllous, with five petals, and five barren and five castrated stamina. There are three capsules; and the seeds are arillated, or inclosed in a deciduous case.

HARUSPICES, pretenders to divination by certain signs or omens among the Romans. The Roman haruspices were at first all taken from Hetruria, where their art had most credit.

Afterwards young Romans were sent into Hetruria, in order to be brought up in the science. It consisted in foretelling future events by attending to various circumstances of the victims. First, It was an ill omen when the victim would not come to the altar without dragging, when it broke its rope, fled away, avoided the stroke, struggled much after it, made a great belching, was long a-dying, or bled but little. Secondly, Prefages were drawn from inspecting the noble parts of the victim when opened; as the heart, lungs, spleen, and especially the liver. If all these were found, if the top of the liver was large and well-made, and if its fibres were strong, it prefaged well for the affair in question. Thirdly, Knowledge was also drawn by the haruspices from the manner in which the fire consumed the victim. If the flame brightened immediately, was pure and clear, rose up in a pyramid without noise, and did not go out till the victim was consumed, these were happy signs. Fourthly, The smoke also was considered, whether it whirled about in curls, or spread itself to the right or the left, or gave a smell different from the common one of broiled meat. Fifthly, It was a lucky omen if the incense they burned melted all at once, and gave a most agreeable smell.

HARVEST, probably derived from a Saxon word signifying *berb-fraß*, is that season of the year when the corn is ripe and fit to be reaped and gathered into barns.

HARVEST Fly, in zoology, a large four-winged fly of the cicada kind, very common in Italy, and erroneously supposed to be a grasshopper. See *CICADA*.

HARVEST-Home, denotes the feast often observed at the close of harvest, and also the song used on that occasion. See *DECEMBER*.

HARVEY (Dr. William), an eminent English physician in the 17th century, was incorporated Doctor of physic in Cambridge, afterwards admitted into the college of physicians in London, and was appointed lecturer of anatomy and chirurgery in that college. In these lectures he opened his discovery relating to the circulation of the blood; which, after a variety of experiments, he communicated to the world in his *Exercitationes anatomicae de motu cordis et sanguinis*. He was physician to king James I. and to king Charles I. and adhered to the royal cause. His works have eternized his memory. In 1651 he published his *Exercitationes de generatione animalium*, a very curious work; but it would have been more so had not his papers been destroyed during the civil wars. In 1654 he was chosen president of the college of physicians in his absence: but his age and weakness were so great, that he could not discharge the duty of that office; and therefore desired them to choose Dr. Pringle. As he had no children, he settled his paternal estate upon the college. He had three years before built a combination-room, a library, and a museum; and in 1656 he brought the deeds of his estate, and presented them to the college. He was then present at the first feast, instituted by himself, to be continued annually, together with a commemoration-speech in Latin; to be spoken on the 18th of October, in honour of the benefactors to the college; he having appointed a handsome stipend for the orator, and also for the keeper of the library and museum, which are still called by his name. He died in 1657: This great physician had the happiness, in his life-time, to find the clamours of ignorance, envy, and prejudice against his doctrine, totally silenced, and to see it universally established. It has, by length of time, been more and more confirmed; and every man now sees and knows it from his own experience. It appears to be of the utmost importance in medicine; as it is perhaps impossible to define health and sickness in fewer words, than that the one is a free, and the other an obstructed, circulation. Dr. Harvey was not only an excellent physician, but an excellent man; his modesty, candour, and

piety were equal to his knowledge; the farther he penetrated into the wonders of nature, the more he was inclined to venerate the Author of it.

HARWICH, a seaport and borough of Essex, with a market on Tuesday and Friday. It is seated on a tongue of land, opposite the united mouths of the Stour and Orwell. It is not very large, but is well inhabited and frequented; and here the packet-boats are stationed that go to Holland. It has a capacious harbour, and a dock for the building of men of war. The entrance into the harbour is defended by a strong fortress, called Land-guard Fort, which is built on a sandy point on the Suffolk side of the water, but within the jurisdiction of Essex. Here is only a chapel of ease, the mother-church being at Dover-court, two miles distant. Harwich is 42 miles E. by N. of Chelmsford, and 72 E. N. E. of London. E. lon. 1. 25. N. lat. 52. 0.

HARWOOD, a small but pretty town in the North Riding of Yorkshire, with a costly stone-bridge of 11 arches over the Wharfe, which runs in a bed of stone, and is as clear as rock-water. Near it are the ruins of an ancient castle, built soon after the conquest; and which remained a neat strong building in Canibden's time. It had a variety of masters; one of whom, in the reign of king John, obtained a grant for a market and fair here. In the reign of Edward III. it was valued at 400 marks a year. This castle was ruined in the civil wars. It has eight or nine dependent constabularies, wherein are many antiquities. The remains of the castle, which seems to have been the keep, are in a condition to exist long. The castle itself covered near an acre of ground. Near it is now Harwood-House, one of the first houses in the county for elegance and superior embellishments; built on part of the site of Gawthorp-Hall, now no more. In the church are some ancient monuments, particularly that of lord chief-justice Gascoigne, who committed the Prince of Wales to prison for striking him on the bench.

HASLEMERE, a small borough of Surry, with a market on Tuesday. It is 12 miles S. W. of Guildford, and 42 S. W. of London.

HASSELQUISTA, in botany; a genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order, *Umbellatæ*. The fruits are quite smooth; the seeds of the radius oval, plane, marginated, and convex in the middle; those in the disk hemispherical and urceolated or bladder-shaped.

HASSELT, a handsome town of the United Provinces, in Overijssel, seated on the river Vecht, five miles from Zwoll.

HASSELT, a town of Germany, in the territory of Liege, seated on the river Demer, 14 miles N. W. of Maastricht.

HASSIDEANS, or **ASSIDEANS**. See **ASSIDEANS**.

HASSOCK, a kind of baf or cushion made of rushes, to kneel or rest the feet upon in churches.

HASTA, or **HASTA Pura**, among medallists, signifies a kind of spear or javelin, not shod or headed with iron; or rather an ancient sceptre, somewhat longer than ordinary, occasionally given to all the gods. The hasta is supposed a symbol of the goodness of the gods, and of the conduct of Providence, which is equally mild and forcible.

HASTA, in some countries, is a measure or quantity of ground amounting to thirty paces: thus called, according to M. Du-Cange, from the hasta or rod wherewith it was measured.

HASTATED LEAF. See **BOTANY**, p. 48 and 49.

HASTING-PEAR, a name given by the gardeners to a species of pear, called also by some the *green ebissel pear*. This is a moderately large pear, and is longish towards the pedicle; its skin is thin, and of a whitish green; the pulp is melting, and of a sugary flavour. It ripens in July.

HASTINGS, a borough of Suffex, with a market on Wed-

nesday and Saturday. It is one of the Cinque-ports, and noted for being the place where William the Conqueror landed. It is seated between a high cleft toward the sea, and a high hill toward the land side. The chief employment of the people is fishing. It had once a strong castle, now in ruins, and its harbour is maintained by a small river. It is 24 miles E. of Lewes, and 64 S. E. of London. E. lon. 0. 46. N. lat. 50. 52.

HASTIVE, a French term, sometimes used in English for early, forward, or something that comes before the ordinary time or season. The hative fruits are strawberries and cherries. We have hative peas, &c.

HAT, a covering for the head, worn by the men throughout the western part of Europe. Hats are said to have been first seen about the year 1400, at which time they became of use for country wear, riding, &c. F. Daniel relates, that when Charles II. made his public entry into Rouen, in 1449, he had on a hat lined with red velvet, and surmounted with a plume or tuft of feathers: he adds, that it is from this entry, or at least under this reign, that the use of hats and caps is to be dated, which henceforward began to take place of the chaperoons and hoods that had been worn before. In the process of time, from the laity, the clergy also took this part of the habit; but it was looked on as a great abuse, and several regulations were published, forbidding any priest or religious person to appear abroad in a hat without coronets, and enjoining them to keep to the use of chaperoons, made of black cloth, with decent coronets; if they were poor, they were at least to have coronets fastened to their hats, and this upon penalty of suspension and excommunication. Indeed the use of hats is said to have been of a longer standing among the ecclesiastics of Brittany, by two hundred years, and especially among the canons; but these were no other than a kind of caps, and from hence arose the square caps worn in colleges, &c. Lobineau observes, that a bishop of Dol, in the 12th century, zealous for good order, allowed the canons alone to wear such hats; enjoining, that if any other person come with them to church, divine service should immediately be suspended. Hats make a very considerable article in commerce: the finest, and those most valued, are made of pure hair of an amphibious animal, called the castor or beaver, frequent in Canada and other provinces of North America. See **BEAVER**.

HAT-making. Hats are made either of wool, or hair of various animals, particularly of the castor, hare, rabbit, camel, &c. The process is much the same in all; for which reason we shall content ourselves to instance that of the beaver. The skin of this animal is covered with two kinds of hair; the one long, stiff, glossy, and rather thin set; this is what renders the skin or fur of so much value: the other is short, thick, and soft, which alone is used in hats. To tear off one of these kinds of hair, and cut the other, the hatters, or rather the women employed for that purpose, make use of two knives, a large one like a shoemaker's knife for the long hair; and a smaller not unlike a vine-knife, wherewith they shave or scrape off the shorter hair.

When the hair is off, they mix the stuff; to one third of dry castor putting two-thirds of old coat, i. e. of hair which has been worn some time by the savages, and card the whole with cards, like those used in the woollen manufactory; only finer; this done, they weigh it, and take more or less according to the size or thickness of the hat intended. The stuff is now laid on the hurdle, which is a square table, parallel to the horizon, having longitudinal chinks cut through it; on this hurdle, with an instrument called a *boru*, much like that of a violin, but larger, whose string is worked with a little bow tick, and thus made to play on the furs, they fly and mix together; the dust and filth at the same time passing through the chinks. This they reckon one

of the most difficult operations in the whole, on account of the justness required in the hand to make the stuff fall precisely together, and that it may be every where of the same thickness. In lieu of a bow, some hatters make use of a sieve or searce of hair, through which they pass the stuff.

After this manner they form gores, or two capades, of an oval form, ending in an acute angle at top; and with what stuff remains, they supply and strengthen them in places where they happen to be slenderer than ordinary; though it is to be remembered, that they designedly make them thicker in the brim, near the crown, than toward the circumference, or in the crown itself.

The capades thus finished, they go on to harden them into closer and more consistent flakes by pressing down a hardening skin or leather thereon; this done, they are carried to the bason, which is a sort of bench with an iron plate fitted therein, and a little fire underneath it; upon which laying one of the hardened capades, sprinkled over with water, and a sort of mould being applied thereon, the heat of the fire, with the water and pressing, imbody the matter into a slight hairy sort of stuff or felt; after which, turning up the edges all round the mould, they lay it by, and thus proceed to the other: this finished, the two next are joined together, so as to meet in an angle at the top, and only form one conical cap, after the manner of a manica Hippocratis, or flannel bag.

The hat thus basoned, they remove it to a large kind of receiver or trough, resembling a mill-hopper, going sloping or narrowing down from the edge or rim to the bottom, which is a copper-kettle filled with water and grounds, kept hot for that purpose. On the descent or sloping side, called the *plank*, the basoned hat, being first dipped in the kettle, is laid; and here they proceed to work it, by rolling and unrolling it again and again, one part after another, first with the hand, and then with a little wooden roller, taking care to dip it from time to time, till at length, by thus fulling and thickening it four or five hours, it is reduced to the extent or dimensions of the hat intended. To secure the hands from being injured by this frequent rolling, &c. they usually guard them with a sort of thick gloves.

The hat thus wrought, they proceed to give it the proper form, which is done by laying the conical cap on a wooden block, of the intended size of the crown of the hat, and thus tying it round with a packthread, called a *commander*: after which, with a piece of iron, or copper bent for that purpose, and called a *stamper*, they gradually beat or drive down the commander all round, till it has reached the bottom of the block, and thus is the crown formed; what remains at bottom below the string being the brim.

The hat being now set to dry, they proceed to finge it, by holding it over a flare of straw or the like; then it is pounced, or rubbed over with pumice, to take off the coarser knap; then rubbed over afresh with seal-skin to lay the knap a little finer; and lastly, carded with a fine card to raise the fine cotton, with which the hat is afterwards to appear.

Things thus far advanced, the hat is thus sent, upon its block, and tied about with a packthread as before, to be dyed. The dye being completed, the hat is returned to the hatter, who proceeds to dry it, by hanging it in the top or roof of a stove or oven, at the bottom of which is a charcoal fire; when dry, it is to be stiffened, which is done with melted glue or gum senegal, applied thereon by first smearing it, and beating it over with a brush, and then rubbing it with the hand. The next thing is to steam it on the steaming bason, which is a little hearth or fire-place, raised three feet high, with an iron-plate laid over it, exactly covering the hearth; on this plate they first spread cloths, which being sprinkled over with water to secure the hat from burning, the hat is placed brim downwards thereon; when moderately hot, the workman strikes gently on

the brim with the flat of his hand, to make the joinings incorporate and bind so as not to appear; turning it from time to time, this way and that way, and at last overturning and setting it in the crown. When steamed sufficiently, and dried, they put it again on the block, and brush and iron it on a table or bench for the purpose, called the *stall-board*; this they perform with a sort of irons like those commonly used in ironing linen, and heated like them; which being rubbed over and over each part of the hat, with the assistance of the brush, smooths and gives it a gloss, which is the last operation; nothing now remaining but to clip the edges even with scissars, and sew a lining to the crown.

Dyeing of HATS. The instructions of Mr. Colbert direct hats to be first strongly galled, by boiling them a long time in a decoction of galls with a little logwood, that the dye may penetrate the better into their substance; after which a proper quantity of vitriol and decoction of logwood, with a little verdigris, are added, and the hats continued in this mixture also for a considerable time. They are afterwards to be put into a fresh liquor of logwood, galls, vitriol, and verdigris; and where the hats are of great price, or of a hair which difficultly takes the dye, the same process is to be repeated a third time. For obtaining the most perfect colour, the hair or wool is to be dyed blue previously to its being formed into hats. The present practice is more compendious, and affords, as we may daily see, a very good black. According to Dr. Lewis, it does not materially differ from that of the *Encyclopédie*, which is as follows.

An hundred pounds of logwood, 12 pounds of gum, and six pounds of galls, are boiled in a proper quantity of water for some hours; after which, about six pounds of verdigris and ten of green vitriol are added, and the liquor kept just simmering, or of a heat a little below boiling. Ten or twelve dozen of hats are immediately put in, each on its block, and kept down by cross bars for about an hour and an half: they are then taken out and aired, and the same number of others put in their room. The two sets of hats are thus dipped and aired alternately, eight times each; the liquor being refreshed each time with more of the ingredients, but in less quantity than at first.

This process (says Dr. Lewis) affords a very good black on woollen and silk stuffs as well as on hats, as we see in the small pieces of both kinds which are sometimes dyed by the hatters. The workmen lay great stress upon the verdigris, and affirm that they cannot dye a black hat without it: it were to be wished that the use of this ingredient were more common in the other branches of the black dye; for the hatters' dye, both on silk and woollen, is reckoned a finer black than what is commonly produced by the woollen and silk-dyers.

HATS are also made for women's wear, not only of the above stuffs, but of chips, straw, or cane, by plaiting, and sewing the plaits together; beginning with the centre of the crown, and working round till the whole is finished. Hats for the same purpose are also wove and made of horse-hair, silk, &c.

HAT is also figuratively used for the dignity of cardinal, or a promotion to that dignity. In this sense they say, "to expect the hat; to claim, or have pretensions to, the hat," &c. Pope Innocent IV. first made the hat the symbol or cognizance of the cardinals, enjoining them to wear a red hat at the ceremonies and processions, in token of their being ready to spill their blood for Jesus Christ.

HATCH, or HATCHWAY, a square or oblong opening in the deck of a ship, of which there are several, forming the passages from one deck to another, and into the hold or lower apartments. See pl. 90, Vol. II.; where A represents the main-hatchway of the lower deck; NN the fore-hatchway; and OO the after-hatchway. There are likewise hatches of a smaller kind, called *scuttles*. See UU in the same figure; as also the article SCUTTLE. Hatches is also, though improperly,

a name applied by sailors to the covers or lids of the hatch-way.

HATCHEL, **HITCHEL**, or **HECKLE**, in the manufactory of flax, hemp, &c. a tool, not unlike a card, for dressing and combing them into fine hairs. They consist of sharp-pointed iron pins, or teeth, set orderly in a board. Of these there are several sorts, some with finer and shorter, others with coarser and longer teeth. See **FLAX**.

HATCHES, in mining, a term used in Cornwall, to express any of the openings of the earth either into mines or in search of them. The fruitless openings are called *effay-hatches*; the real mouths of the veins, *tin-hatches*; and the places where they wind up the buckets of ore, *wind-hatches*.

HATCHES also denote flood-gates set in a river, &c. to stop the current of the water, particularly certain dams or mounds made of rubbish, clay, or earth, to prevent the water that issues from the stream-works and tin-washes in Cornwall from running into the fresh rivers.

HATCHET, a small light sort of axe, with a basil edge on its left side, and a short handle, calculated to be used with one hand. Hatchets are used by various artificers, and more particularly in hewing of wood.

HATCHING, the maturing fecundated eggs, whether by the incubation and warmth of the parent bird, or by artificial heat, so as to produce young chickens alive. The art of hatching chickens by means of ovens has long been practised in Egypt; but it is there only known to the inhabitants of a single village named *Berne*, and to those that live at a small distance from it. Towards the beginning of autumn they scatter themselves all over the country; where each person among them is ready to undertake the management of an oven, each of which is of a different size; but, in general, they are capable of containing from forty to fourscore thousand eggs. The number of these ovens placed up and down the country is about 386, and they usually keep them working for about six months: as, therefore, each brood takes up in an oven, as under a hen, only 21 days, it is easy in every one of them to hatch eight different broods of chickens. Every *Bermean* is under the obligation of delivering to the person who intrusts him with an oven, only two-thirds of as many chickens as there have been eggs put under his care; and he is a gainer by this bargain, as more than two-thirds of the eggs usually produce chickens. In order to make a calculation of the number of chickens yearly so hatched in Egypt, it has been supposed that only two-thirds of the eggs are hatched, and that each brood consists of at least 30,000 chickens; and thus it would appear, that the ovens of Egypt give life yearly to at least 92,640,000 of these animals.

This useful and advantageous method of hatching eggs was originally discovered in France by the ingenious Mr. Reaumur; who, by a number of experiments, reduced the art to certain principles. He found by experience, that the heat necessary for this purpose is nearly the same with that marked 32 on his thermometer, or that marked 96 on Fahrenheit's. This degree of heat is nearly that of the skin of the hen, and, what is remarkable, of the skin of all other domestic fowls, and probably of all other kinds of birds. The degree of heat which brings about the development of the cygnet, the gosling, and the turkey-pout, is the same as that which fits for hatching the canary songster, and, in all probability, the smallest humming-bird: the difference is only in the time during which this heat ought to be communicated to the eggs of different birds; it will bring the canary bird to perfection in 11 or 12 days, while the turkey pout will require 27 or 28.

After many experiments, Mr. Reaumur found, that stoves heated by means of a baker's oven succeeded better than those made hot by layers of dung: and the furnaces of glass-houses

and those of the melters of metals, by means of pipes to convey heat into a room, might, no doubt, be made to answer the same purpose. As to the form of the stoves, no great nicety is required. A chamber over an oven will do very well. Nothing more will be necessary than to ascertain the degree of heat; which may be done by melting a lump of butter of the size of a walnut, with half as much tallow, and putting it into a phial. This will serve to indicate the heat with sufficient exactness: for when it is too great, this mixture will become as liquid as oil; and when the heat is too small, it will remain fixed in a lump: but it will flow like a thick syrup, upon inclining the bottle, if the stove be of a right temper. Great attention therefore should be given to keep the heat always at this degree, by letting in fresh air, if it be too great, or shutting the stove more close if it be too small: and that all the eggs in the stove may equally share the irregularities of the heat, it will be necessary to shift them from the sides to the centre; and thus to imitate the hens, who are frequently seen to make use of their bills, to push to the outer parts those eggs that were nearest to the middle of their nests, and to bring into the middle such as lay nearest the sides.

Mr. Reaumur has invented a sort of low boxes, without bottoms, and lined with furs. These, which he calls *artificial parents*, not only shelter the chickens from the injuries of the air, but afford a kindly warmth, so that they presently take the benefit of their shelter as readily as they would have done under the wings of a hen. After hatching, it will be necessary to keep the chickens, for some time, in a room artfully heated and furnished with these boxes; but afterwards they may be safely exposed to the air in the court-yard, in which it may not be amiss to place one of these artificial parents to shelter them if there should be occasion for it.

As to the manner of feeding the young brood, they are generally a whole day after being hatched, before they take any food at all; and then a few crumbs of bread may be given them for a day or two, after which they will begin to pick up insects and grass for themselves. But to save the trouble of attending them, capons may be taught to watch them in the same manner as hens do. Mr. Reaumur alleges, that he has seen above 200 chickens at once, all led about and defended only by three or four such capons. Nay, cocks may be taught to perform the same office; which they, as well as the capons, will continue to do all their lives after.

HATCHING, or **HACHING**, in designing, &c. the making of lines with a pen, pencil, graver, or the like; and the intersecting or going across those lines with others drawn a contrary way, is called *counter-hatching*. The depths and shadows of draughts are usually formed by hatching. Hatching is of singular use in heraldry, to distinguish the several colours of a shield, without being illumined: thus, gules or red is hatched by lines drawn from the top to the bottom; azure, by lines drawn across the shield; and so of other colours.

HATCHMENT, in heraldry, the coat-of-arms of a person dead, usually placed on the front of a house, whereby may be known what rank the deceased person was of when living: the whole distinguished in such a manner as to enable the beholder to know whether he was a bachelor, married man, or widower; with the like distinctions for women.

HATFIELD, a town of Herts, with a market on Thursday. It formerly belonged to the see of Ely, but was alienated to the crown in the reign of queen Elizabeth. It had before been an occasional royal residence, notwithstanding it was the property of the church. William of Hatfield, second son of Edward III. was born here; and hence Elizabeth, on the death of Mary, was conducted to ascend the throne. King James exchanged this royal demesne with Sir Robert Cecil, afterwards earl of Salisbury, for Theobalds. On the site of the ancient episcopal

palace, that nobleman built the present magnificent seat of the marquis of Salisbury, called Hatfield House. It is seated on the river Lea, 20 miles N. N. W. of London. W. lon. 0. 10. N. lat. 51. 48.

HATFIELD BROAD-OAK, or *Hatfield-Regis*, a town of Essex, with a market on Saturday. It is 30 miles E. N. E. of London.

HATHERLY, a town of Devonshire, with a market on Friday. It is 26 miles N. W. of Exeter, and 201 W. by S. of London. W. lon. 4. 9. N. lat. 50. 52.

HATTEM, a town of the United Provinces, in Guelderland, seated on the river Yssel, five miles S. W. of Zwoll. It was taken by the French in 1672, who demolished the fortifications.

HATTEMISTS, in ecclesiastical history, the name of a modern Dutch sect, so called from Pontian Van Hattem, a minister in the province of Zealand, towards the close of the last century, who being addicted to the sentiments of Spinoza, was on that account degraded from his pastoral office. The Verschorists and Hattemists resemble each other in their religious systems, though they never so entirely agreed as to form one communion. The founders of these sects deduced from the doctrine of absolute decrees a system of fatal and uncontrollable necessity; they denied the difference between moral good and evil, and the corruption of human nature: from hence they farther concluded, that mankind were under no sort of obligation to correct their manners, to improve their minds, or to obey the divine laws; that the whole of religion consisted not in acting, but in suffering; and that all the precepts of Jesus Christ are reducible to this one, that we bear with cheerfulness and patience the events that happen to us through the divine will, and make it our constant and only study to maintain a permanent tranquillity of mind. Thus far they agreed; but the Hattemists farther affirmed, that Christ made no expiation for the sins of men by his death, but had only suggested to us by his mediation, that there was nothing in us that could offend the Deity; this, they say, was Christ's manner of justifying his servants, and presenting them blameless before the tribunal of God. It was one of their distinguished tenets, that God does not punish men for their sins, but by their sins. These two sects, says Mosheim, still subsist, though they no longer bear the names of their founders.

HATTOCK, a flock of corn containing twelve sheaves; others make it only three sheaves laid together.

HATUAN, a town and fort of Upper Hungary, in the county of Novigrod, 28 miles N. E. of Buda. It was taken by the Imperialists in 1685. It is seated on a mountain, in E. lon. 19. 48. N. lat. 47. 52.

HAVANNA, a sea port on the N. W. part of the island of Cuba, opposite Florida. It is famous for its harbour, which is so large that it may hold 1000 vessels; and yet the mouth is so narrow, that only one ship can enter at a time. This is the place where all the ships that come from the Spanish settlements rendezvous on their return to Spain. It is near two miles in circumference, and, in 1700, was computed to contain 26,000 inhabitants, Spaniards, Mulattoes, and Negroes; a number which must have been considerably increased since. The entrance into the harbour is well defended by forts and platforms of great guns. The buildings are elegant, built of stone, and some of them superbly furnished; and the churches are rich and magnificent. Here is the residence of the governor and captain-general of Cuba, and of the royal officers, as well as of an assessor for the assistance of the governor and captain-general of the West Indies, of the bishop of St. Jago de Cuba, and of most of the men of fashion and fortune belonging to the island. It was taken by the English in 1762, but restored to the Spaniards by the treaty of peace in 1763. It is seated on the W.

side of the harbour, and is watered by two branches of the river Lagida. W. lon. 82. 13. N. lat. 23. 12.

HAVANT, a town of Hampshire, with a market on Saturday. It is seven miles N. E. of Portsmouth, and 64 W. by S. of London. E. lon. 0. 58. N. lat. 50. 52.

HAVEL, a river of Brandenburg, which proceeds from a lake in the duchy of Mecklenburg, and running through the middle Marche, and through Brandenburg and other towns, runs north, and falls into the Elbe.

HAVELBERG, a town of Germany, in the circle of Lower Saxony, and in the electorate of Brandenburg, with a bishop's see, secularized in favour of the house of Brandenburg. It is seated on the river Havel, in E. lon. 12. 43. N. lat. 53. 4.

HAVEN, a sea-port or harbour for ships. See PORT and HARBOUR. The word is derived from the Saxon *havene*, or the German *bafen*, or the French *bavre*; which all signify the same thing.

HAVERCAMP (Sigibert), a celebrated Dutch scholar and critic, professor of history, eloquence, and the Greek tongue, at Leyden. He was particularly skilled in medals; and was the author of some esteemed works in that way, beside giving good and elegant editions of several Greek and Latin authors. He died at Leyden in 1742, aged 58.

HAVERFORDWEST, a town of Pembrokeshire, with a market on Tuesday and Saturday. It is a town and county of itself, seated on the side of a hill, on a creek of Milford-Haven, over which is a stone bridge. It is a large handsome place, inhabited by many genteel families, and contains three parish churches. It has a considerable trade, with several vessels belonging to it, and sends one member to parliament. The assizes and county gaol are kept here; and it had once a wall and castle, now demolished. It is 15 miles S. by E. of St. David's, and 239 W. by N. of London. W. lon. 5. 0. N. lat. 51. 50.

HAVERILL, a town of Suffolk, with a market on Wednesday. It has a great manufactory of checks, cottons, and fustians, and is 59 miles N. E. of London.

HAUL, or HALE, an expression peculiar to seamen, implying to pull a single rope, without the assistance of blocks or other such mechanical powers. When a rope is otherwise pulled, as by the application of tackles, or the connection with blocks, &c. the term is changed into *bowing*. To *HAUL the Wind*, is to direct the ship's course nearer to that point of the compass from which the wind arises. Thus, supposing a ship to sail south-west, with the wind northerly, and some particular occasion requires to haul the wind more westward; to perform this operation, it is necessary to arrange the sails more obliquely with her keel; to brace the yards more forward, by slackening the starboard and pulling in the larboard braces, and to haul the lower sheets further aft; and, finally, to put the helm a-port, i. e. over to the larboard side of the vessel. As soon as her head is turned directly to the westward, and her sails are trimmed accordingly, she is said to have hauled the wind four points; that is to say, from south-west to west. She may still go two points nearer to the direction of the wind, by disposing her sails according to their greatest obliquity, or, in the sea-phrase, by *trimming all sharp*; and in this situation she is said to be close hauled, as sailing west-north-west.

HAUM, HALM, or *Hawm*, among farmers, denotes the stem or stalk of corn, pease, beans; &c. from the root to the ear.

HAUNCH, or HANCH, the *Hip*, or that part of the body between the last ribs and the thigh. The haunches of a horse are too long, if when standing in the stable he limps, with his hind-legs farther back than he ought; and when the top or onset of his tail is not in a perpendicular line to the tip of his

hocks, as it always does in horses whose haunches are of a just length. There are some horses which, though they have too long haunches, yet commonly walk well: such are good to climb hills, but are not at all sure upon a descent; for they cannot ply their hams, and never gallop slowly, but always nearly upon a full speed. The art of riding the great horse has not a more necessary lesson than that of putting a horse upon his haunches; which, in other words, is called *coupling him well*, or putting him well together, or compact. A horse that cannot bend or lower his haunches, throws himself too much upon his shoulder, and lies heavy upon the bridle.

HAVRE, in geography, &c. a French term signifying the same with haven or harbour.

HAUVRE de Grace, a large, populous, and well-built commercial town of France, in the department of Lower Seine and late province of Normandy. It has an excellent harbour, a strong citadel, and a good arsenal. It was bombarded by the English in 1694 and 1759, and is seated at the mouth of the Seine, 45 miles W. of Rouen, and 112 N. W. of Paris. E. lon. o. 11. N. lat. 49. 29.

HAURIANT, in heraldry, a term peculiar to fishes; and signifies their standing upright, as if they were refreshing themselves by sucking in the air.

HAUTEFEUILLE (John), an ingenious mechanic, born at Orleans in 1647. Though he embraced the state of an ecclesiastic, and enjoyed several benefices, he applied almost his whole life to mechanics, in which he made a great progress. He had a particular taste for clock-work, and made several discoveries in it that were of singular use. It was he who found out the secret of moderating the vibration of the balance by means of a small steel spring, which has since been made use of. This discovery he laid before the members of the Academy of Sciences in 1674; and these watches are, by way of eminence, called *pendulum-watches*; not that they have real pendulums, but because they nearly approach to the justness of pendulums. M. Huygens perfected this happy invention; but having declared himself the inventor, and obtained from Louis XIV. a patent for making watches with spiral springs, the abbé Feuille opposed the registering of this privilege, and published on the subject against M. Huygens. He wrote a great number of other pieces, most of which are small pamphlets consisting of a few pages, but very curious; as, 1. His perpetual pendulum, quarto. 2. New inventions, quarto. 3. The art of breathing under water, and the means of preserving a flame shut up in a small place. 4. Reflections on machines for raising water. 5. His opinion on the different sentiments of Mallebranche and Regis relating to the appearance of the moon when seen in the horizon. 6. The magnetic balance. 7. A placet to the king on the longitude. 8. Letter on the secret of the longitude. 9. A new system on the flux and reflux of the sea. 10. The means of making sensible experiments that prove the motion of the earth; and many other pieces. He died in 1724.

HAUTBOY, a musical instrument of the wind kind, shaped much like the clarinet. It spreads and widens towards the bottom, and is sounded through a reed. The treble is two feet long; the tenor goes a fifth lower when blown open: it has only eight holes; but the bass, which is five feet long, has eleven. The word is French, *baut bois*, q. d. "high wood;" and is given to this instrument because its tone ascends higher than that of the violin.

HAW, a sort of berry, the fruit of several species of *mespilus*, thence denominated *hawthorns*. See *MESPILUS*.

HAW, among farriers, an excrescence resembling a gristle, growing under the nether eye-lid and eye of a horse, which, if not timely removed, will cause blindness. See *FARRIERY*, page 423.

HAW, a small parcel of land so called in Kent, as a *Hemp-*

barw, or *Beanbarw*, lying near the house, and inclosed for these uses. But Sir Edward Coke, in an ancient plea concerning Faversham in Kent, says *barwes* are houses.

HAW-Finch. See *LOXIA*.

HAWGH, or HOWGH, signifies a green plot in a valley as they use it in the north of England.

HAWK, in ornithology. See *FALCO*.

HAWKERS, anciently were fraudulent persons, who went from place to place buying and selling brags, pewter, and other merchandize, which ought to be uttered in open market. In this sense the word is mentioned *anno* 25 Hen. VIII. cap. 6. and 33 *ejusdem*, cap. 4. The appellation *hawkers* seems to have arisen from their uncertain wandering, like those who, with hawks, sought their game where they could find it. The term is now used as synonymous with pedlar; a person who travels about the country selling wares. Former acts of parliament require every hawker to take out an annual licence, paying for it 4l. and if he travel with a horse, ass, or mule, for every one of them 8l. If he travel without a licence, or contrary to it, he forfeits for every offence to the informer, and the poor of the parish where discovered, 10l. The acts relating to hawkers do not extend to makers of goods or their agents; or to those who sell goods in fairs or markets; to the sellers of fish, fruit, or other victuals; nor to the venders of books and newspapers, 9 and 10 W. cap. 27. 3 and 4 Anne, cap. 4. But hawkers shall not, by virtue of such licence, sell or offer to sale any tea or spirituous liquors, though with a permit, under the penalty of having the same seized, and imprisonment and prosecution of the offender. 9 Geo. II. cap. 35. Hawkers who were licensed on June 23, 1785, may set up any business in the place where they are resident inhabitants, though not brought up thereto, and may employ therein persons who have not been apprentices. Additional duties are, however, imposed on hawkers, by subsequent acts; viz. 29 Geo. III. c. 26. and 35 Geo. III. c. 91. which likewise subject them to various regulations not enjoined by former acts.

HAWKERS is a term also applied to those who go up and down London streets and country towns, selling newspapers, pamphlets, &c.

HAWKESWORTH (John), a celebrated English writer, was born about the year 1719; though his epitaph, as we find it in the Gentleman's Magazine for Aug. 1781, makes him to have been born in 1715. He was brought up to a mechanical profession, that of a watchmaker as is supposed. He was of the Presbyterian persuasion, and a member of the celebrated Tom Bradbury's meeting, from which he was expelled for some irregularities. He afterwards devoted himself to literature, and became an author of considerable eminence. In the early part of life his circumstances were rather confined. He resided some time at Bromley in Kent, where his wife kept a boarding-school. He afterwards became known to a lady who had great property and interest in the East India company, and through her means was chosen a director of that body. As an author, his *Adventurer* is his capital work; the merits of which, if we mistake not, procured him the degree of LL.D. from Herring archbishop of Canterbury. When the design of compiling a narrative of the discoveries in the South Seas was on foot, he was recommended as a proper person to be employed on the occasion: but in truth he was not a proper person, nor did the performance answer expectation. Works of taste and elegance, where imagination and the passions were to be affected, were his province; not works of dry, cold, accurate narrative. However, he executed his task, and is said to have received for it the enormous sum of 6000l. He died in 1773; some say, of high living; others, of chagrin from the ill reception of his *Narrative*: for he was a man of the keenest sensibility, and obnoxious to all the evils of such irritable natures. A handsome marble me-

ment was erected to his memory at Bromley in Kent. The latter part of the inscription is taken from the last number of *The Adventurer*; it runs thus: "The hour is hasting, in which whatever praise or censure I have acquired will be remembered with equal indifference. Time, who is impatient to date my last paper, will shortly moulder the hand which is now writing it in the dust, and still the breast that now throbs at the reflection. But let not this be read as something that relates only to another; for a few years only can divide the eye that is now reading from the hand that has written."

HAWKING, the exercise of taking wild-fowl by means of hawks. The method of reclaiming, manning, and bringing up a hawk to this exercise, is called *falcoury*. See *FALCONRY*. There are only two countries in the world where we have any evidence that the exercise of hawking was very anciently in vogue. These are Thrace and Britain. In the former, it was pursued merely as the diversion of a particular district, if we may believe Pliny, (b. x. 8.) whose account is rendered obscure by the darkness of his own ideas of the matter. The primæval Britons, with a fondness for the exercise of hunting, had also a taste for that of hawking; and every chief among them maintained a considerable number of birds for that sport. It appears also from a curious passage in the poems of Ossian, (vol. i. p. 115.) that the same diversion was fashionable at a very early period in Scotland. The poet tells us, that a peace was endeavoured to be gained by the proffer of 100 managed steeds, 100 foreign captives, and "100 hawks with fluttering wings, that fly across the sky." To the Romans this diversion was scarce known in the days of Vespasian; yet it was introduced immediately afterwards. Most probably they adopted it from the Britons; but we certainly know that they greatly improved it by the introduction of spaniels into the island. In this state it appears among the Roman Britons in the sixth century. Gildas, in a remarkable passage in his first epistle, speaks of Maglocunus, on his relinquishing the sphere of ambition, and taking refuge in a monastery; and proverbially compares him to a dove, that hastens away at the noisy approach of the dogs, and with various turns and windings takes her flight from the talons of the hawk.

In after times, hawking was the principal amusement of the English: a person of rank scarce stirred out without his hawk on his hand; which, in old paintings, is the criterion of nobility. Harold, afterwards king of England, when he went on a most important embassy into Normandy, is painted embarking with a bird on his fist, and a dog under his arm: and in an ancient picture of the nuptials of Henry VI. a nobleman is represented in much the same manner; for in those days, *it was thought sufficient for noblemen to wind their horn, and to carry their hawk fair, and leave study and learning to the children of mean people*. The former were the accomplishments of the times; Spenser makes his gallant Sir Trifram boast,

No is there hawk which mantleth her on perch,

Whether high towring, or accoasting low,

But I the measure of her flight doe search,

And all her prey, and all her diet know. B. vi. Canto 2.

In short, this diversion was, among the old English, the pride of the rich, and the privilege of the poor; no rank of men seems to have been excluded the amusement: we learn from the book of St. Alban's, that every degree had its peculiar hawk, from the emperor down to the *boly-water clerk*. Vast was the expence that sometimes attended this sport. In the reign of James I. Sir Thomas Monson is said to have given 1000l. for a cast of hawks: we are not then to wonder at the rigour of the laws that tended to preserve a pleasure that was carried to such an extravagant pitch. In the 34th of Edward III. it was made felony to steal a hawk; to take its eggs, even in a person's own

ground, was punishable with imprisonment for a year and a day, besides a fine at the king's pleasure: in queen Elizabeth's reign, the imprisonment was reduced to three months; but the offender was to find security for his good behaviour for seven years, or lie in prison till he did. Such was the enviable state of the times of old England; during the whole day, the gentry were given to the fowls of the air and the beasts of the field; in the evening they celebrated their exploits with the most abandoned and brutish sottishness; at the same time, the inferior rank of people, by the most unjust and arbitrary laws, were liable to capital punishments, to fines, and loss of liberty, for destroying the most noxious of the feathered tribe.

According to Olearius, the diversion of hawking is more followed by the Tartars and Persians than ever it was in any part of Europe. *Il n'y avoit point de butte* (says he) *qui n'eust son aigle ou son faucon*.

The falcons or hawks that were in use in these kingdoms are now found to breed in Wales, and in North Britain and its isles. The peregrine falcon inhabits the rocks of Caernarvonshire. The same species, with the gyrfalcon, the gentil, and the gohawk, are found in Scotland, and the lanner in Ireland.

We may here take notice, that the Norwegian breed was, in old times, in high esteem in England: they were thought bribes worthy a king. Jeoffrey Fitzpierre gave two good Norway hawks to king John, to obtain for his friend the liberty of exporting 100 wt. of cheese; and Nicholas the Dane was to give the king a hawk every time he came into England, that he might have free liberty to traffic throughout the king's dominions.

They were also made the tenures that some of the nobility held their estates by, from the crown. Thus Sir John Stanley had a grant of the Isle of Man from Henry IV. to be held of the king, his heirs, and successors, by homage and the service of two falcons, payable on the day of his or their coronation. And Philip de Haftang held his manor of Combertoun in Cambridgeshire, by the service of keeping the king's falcons.

Hawking, though an exercise now much disused among us, in comparison of what it anciently was, does yet furnish a great variety of significant terms, which still obtain in our language. Thus, the parts of a hawk have their proper names. The legs, from the thigh to the foot, are called *arms*; the toes, the *petty singles*; the claws, the *pouncers*. The wings are called the *sails*; the long feathers thereof, the *beans*; the two longest, the *principal feathers*; those next thereto, the *flags*. The tail is called the *train*; the breast-feathers, the *mails*; those behind the thigh, the *pendant feathers*. When the feathers are not yet full grown, she is said to be *unsummed*; when they are complete, she is *summed*: The craw, or crop, is called the *gorge*: The pipe next the fundament, where the feces are drawn down, is called the *pannel*: The slimy substance lying in the pannel is called the *glut*: The upper and crooked part of the bill is called the *beak*; the nether part, the *clap*; the yellow part between the beak and the eyes, the *scar* or *scere*; the two small holes therein, the *nares*.

As to her furniture: The leathers, with bells buttoned on her legs, are called *beavits*. The leathern thong, whereby the falconer holds the hawk, is called the *leafe* or *leaf*; the little straps, by which the leafe is fastened to the legs, *jesses*; and a line or pack-thread fastened to the leafe, in disciplining her, a *creance*. A cover for her head, to keep her in the dark, is called a *hood*; a large wide hood, open behind, to be wore at first, is called a *rustler hood*: To draw the strings, that the hood may be in readiness to be pulled off, is called *unstriking the hood*. The blinding a hawk just taken, by running a thread through her eye-lids, and thus drawing them over the eyes, to prepare her for being hooded, is called *feeling*. A figure or resemblance

of a fowl, made of leather and feathers, is called a *lure*. Her resting-place, when off the falconer's fist, is called the *perch*. The place where her meat is laid, is called the *back*; and that wherein she is set, while her feathers fall and come again, the *meu*.

Something given a hawk, to cleanse and purge her gorge, is called *casting*. Small feathers given her to make her cast, are called *plumage*: Gravel given her to help to bring down her stomach, is called *rangle*: Her throwing up filth from the gorge after casting, is called *gleaming*. The purging of her greafe, &c. *enseaming*. Her being stuffed, is called *gurgiting*. The inserting a feather in her wing, in lieu of a broken one, is called *imping*. The giving her a leg, wing, or pinion of a fowl to pull at, is called *tiring*: The neck of a bird the hawk preys on, is called the *inke*: What the hawk leaves of her prey, is called the *pill* or *pelf*.

There are also proper terms for her several actions. When she flutters with her wings, as if striving to get away, either from perch or fist, she is said to *bate*. When, standing too near, they fight with each other, it is called *crabbing*: When the young ones quiver, and shake their wings in obedience to the elder, it is called *cowering*: When she wipes her beak after feeding, she is said to *feak*: When she sleeps, she is said to *jouk*: From the time of exchanging her coat, till she turn white again, is called her *intermewing*: Treading is called *caroking*: When she stretches one of her wings after her legs, and then the other, it is called *mantling*: Her dung is called *muting*; when she mutes a good way from her, she is said to *slize*; when she does it directly down, instead of jerking backwards, she is said to *slime*; and if it be in drops, it is called *dropping*. When she as it were sneezes, it is called *sniting*. When she raises and shakes herself, she is said to *rouse*: When, after mantling, she crosses her wings together over her back, she is said to *warble*.

When a hawk seizes, she is said to *bind*: When, after seizing, she pulls off the feathers, she is said to *plume*. When she raises a fowl aloft, and at length descends with it to the ground, it is called *trussing*. When, being aloft, she descends to strike her prey, it is called *stooping*. When she flies out too far from game, she is said to *rake*. When, forsaking her proper game, she flies at pyes, crows, &c. that chance to cross her, it is called the *check*. When, missing the fowl, she betakes herself to the next check, she is said to *fly on bead*. The fowl or game she flies at is called the *quarry*. The dead body of a fowl killed by the hawk, is called a *pelt*. When she flies away with the quarry, she is said to *carry*. When in stooping she turns two or three times on the wing, to recover herself ere she seizes, it is called *cancelliering*. When she hits the prey, yet does not truss it, it is called *ruff*. The making a hawk tame and gentle, is called *reclaiming*. The bringing her to endure company, *manning* her. An old staunch hawk, used to fly and set example to a young one, is called a *make-hawk*.

The reclaiming, manning, and bringing up a hawk to the sport, is not easy to be brought to any precise set of rules. It consists in a number of little practices and observances, calculated to familiarize the falconer to his bird, to procure the love thereof, &c. See the article FALCONRY.

When your hawk comes readily to the lure, a large pair of luring bells are to be put upon her; and the more giddy-headed and apt to rake out your hawk is, the larger must the bells be. Having done this, and she being sharp-set, ride out in a fair morning, into some large field unencumbered with trees or wood, with your hawk on your fist; then having loosened her hood, whistle softly, to provoke her to fly; unhood her, and let her fly with her head into the wind; for by that means she will be the better able to get upon the wing, and will naturally climb upwards, flying a circle. After she has flown three or four turns, then lure her with your voice, casting the lure about your head, having first tied a pullet to it; and if your falcon come in and

approach near you, cast out the lure into the wind, and if she stoop to it reward her.

You will often find, that when she flies from the fist, she will take stand on the ground: this is a fault which is very common with soar-falcons. To remedy this, fright her up with your wand; and when you have forced her to take a turn or two, take her down to the lure, and feed her. But if this does not do, then you must have in readiness a duck sealed, so that she may see no way but backwards, and that will make her mount the higher. Hold this duck in your hand, by one of the wings near the body; then lure with the voice, to make the falcon turn her head; and when she is at a reasonable pitch, cast your duck up just under her; when, if she strike, stoop, or truss the duck, permit her to kill it, and reward her by giving her a reasonable gorge. After you have practised this two or three times, your hawk will leave the stand, and, delighted to be on the wing, will be very obedient.

It is not convenient, for the first or second time, to show your hawk a large fowl; for it frequently happens, that they escape from the hawk, and she, not recovering them, rakes after them: this gives the falconer trouble, and frequently occasions the loss of the hawk. But if she happens to pursue a fowl, and, being unable to recover it, gives it over, and comes in again directly, then cast out a sealed duck; and if she stoop and truss it across the wings, permit her to take her pleasure, rewarding her also with the heart, brains, tongue, and liver. But if you have not a quick duck, take her down with a dry lure, and let her plume a pullet and feed upon it. By this means a hawk will learn to give over a fowl that rakes out, and, on hearing the falconer's lure, will make back again, and know the better how to hold in the head.

Some hawks have a disdainful coyness, proceeding from their being high fed: such a hawk must not be rewarded though she should kill: but you may give her leave to plume a little; and then taking a sheep's heart cold, or the leg of a pullet, when the hawk is busy in pluming, let either of them be conveyed into the body of the fowl, that it may favour of it; and when the hawk has eaten the heart, brains, and tongue of the fowl, take out what is inclosed, call her to your fist, and feed her with it: afterwards give her some of the feathers of the fowl's neck, to scower her, and make her cast.

If your hawk be a stately high-flying one, she ought not to take more than one flight in a morning; and if she be made for the river, let her not fly more than twice; when she is at the highest, take her down with your lure; and when she has plumed and broken the fowl a little, feed her, by which means you will keep her a high-flier, and fond of the lure.

HAWKWOOD (Sir John), a famous English general, was the son of a tanner at Heddingham-Sibil in Essex, where he was born in the reign of Edward III. He was bound apprentice to a taylor in London; but being fortunately praised into the army, was sent abroad, where his genius soon expanded itself, and surmounted the narrow prejudices which adhered to his birth and occupation. He signalized himself as a soldier in France and Italy, and particularly at Pisa and Florence. He commanded with great ability and success in the army of Galeacio duke of Milan; and was in such high esteem with Barnabas his brother, that he gave him Domitia his natural daughter in marriage, with an ample fortune. He died at Florence, full of years and military fame, in 1394.

HAWSE, or HAUSE, is generally understood to imply the situation of the cables before the ship's stem, when she is moored with two anchors out from forward, viz. one on the starboard, and the other on the larboard bow. Hence it is usual to say, *she has a clear hawse*, or *a foul hawse*. It also denotes any small distance ahead of a ship, or between her head and the anchors employed to ride her, as, "He has anchored in our hawse, The brig fell athwart our hawse," &c. A ship is said to ride

with a clear hawse, when the cables are directed to their anchors, without lying athwart the stem; or crossing, or being twisted round each other by the ship's winding about, according to the change of the wind, tide, or current. A foul hawse, on the contrary, implies that the cables lie across the stem, or bear upon each other, so as to be rubbed and chafed by the motion of the vessel. The hawse accordingly is foul, by having either a cross, an elbow, or a round turn. If the larboard cable, lying across the stem, points out on the starboard side, while the starboard cable at the same time grows out on the larboard side, there is a cross in the hawse. If, after this, the ship, without returning to her former position, continues to wind about the same way, so as to perform an entire revolution, each of the cables will be twisted round the other, and then directed out from the opposite bow, forming what is called a round turn. An elbow is produced when the ship stops in the middle of that revolution, after having had a cross: or, in other words, if she rides with her head northward with a clear hawse, and afterwards turns quite round so as to direct her head northward again, she will have an elbow.

HAWSE-Holes, certain cylindrical holes cut through the bows of a ship on each side of the stem, through which the cables pass in order to be drawn into or let out of the vessel as occasion requires. They are fortified on each side by the

HAWSE-Pieces, a name given to the foremost timbers of a ship, whose lower ends rest on the knuckle-timber, or the foremost of the cant-timbers. They are generally parallel to the stem, having their upper ends sometimes terminated by the lower part of the beakhead; and otherwise, by the top of the bow, particularly in small ships and merchantmen.

HAWSER, a large rope which holds the middle degree between the *cable* and *tow-line*, in any ship whereto it belongs, being a size smaller than the former, and as much larger than the latter.

HAY, any kind of grafs cut and dried for the food of cattle. The time of mowing grafs for hay must be regulated according to its growth and ripeness; nothing being more prejudicial to the crop than mowing it too soon; because the sap is not then fully come out of the root, and when made into hay, the grafs shrinks away to nothing. It must not, however, be let stand too long till it have shed its seeds. When the tops of the grafs look brown, and begin to bend down, and the red honeyfuckle flowers begin to wither, you may conclude it ripe for mowing.

Sain-Foin HAY, is of several sorts, which may be distinguished by the following terms, viz. 1. The virgin. 2. The blossomed. 3. The full-grown. And, 4. The threshed hay. The first of these is beyond comparison the best. It must be cut before the blossoms generally appear; for when it stands till it is full blown, the most spirituous and nourishing parts of its juice are spent, the sap is much impoverished, and the sain-foin can never recover that richness it had in its virgin state. But this fine hay cannot well be had of uncultivated sain-foin, because that may not be much above an handful high when it is in a condition to be cut; it would then make a very light crop, and would be a great while before it sprang up again: but the rich will have two or three tons to an acre, and spring again immediately for a second crop; so that little or none in quantity would be lost by so great an improvement of its quality.

The second sort is that cut in the flower, which, though much inferior to the virgin hay, far exceeds any other kind as yet commonly propagated in Britain; and if it be a full crop, it may amount to three tons an acre. This is that sain-foin which is commonly made; and the larger it is, the more nourishing it is for horses.

The next sort of sain-foin is the full grown, cut when the blossoms are gone or going off: this also is good hay, though it falls short by many degrees of the goodness of the other two

sorts; but it makes a greater crop than either of them, because it grows to its full bulk, and shrinks little in drying.

The last sort is the threshed hay; which, when not damaged by wet weather, has been found more nourishing to horses than coarse water-meadow hay; and, when it is cut small by an engine, is good for cattle, and much better than the chaff of corn. The best time to cut it, is when the greatest part of the seed is well filled; the first-blown ripe, and the last-blown beginning to be full.

The goodness of the hay depends greatly upon the manner of managing it. The best hay in all England is made of sain-foin, without ever spreading it. This method, though it be longer before it be finished, costs less labour than the other. If sain-foin be laid up pretty green, it will take no damage, provided it be set in small round ricks, with a large basket drawn up in the middle of each, to have a vent-hole, through which the superfluous moisture of the hay may transpire. As soon as its heating is over, these ricks ought to be thatched; and all sain-foin ricks, that are made when the hay is full dried in the cocks, ought to be thatched immediately after the making them. That which is laid up most dried, will come out of the rick of a green colour; but that which has been much heated in the rick, will be brown.

The seed affords the owner another opportunity of making a profit of his sain-foin: but this, if the hoeing husbandry were general, would not be vendible in great quantities for planting; because the ordinary crop of an acre will produce seed enough to drill an hundred acres, which would not want planting for a long time. The other use then of this seed is for provender; and it has been affirmed by some who have made trials of it, that three bushels of good sain-foin seed given to horses, will nourish them as much as four bushels of oats; and when well ordered, it is so sweet, that most sorts of cattle are greedy of it.

HAY-Making. See **HUSBANDRY**.

HAY, a town of Brecknockshire, in Wales, seated near the confluence of the rivers Wye and Dulas. It was a town of good note in the time of the Romans; it being then fortified with a castle and a wall, which were ruined in the rebellion of Owen Glendower. It is at present a pretty good town; and the market is large for corn, cattle, and provisions. W. lon. o. 56. N. lat. 52. 10.

HAY (William, Esq.), an agreeable English writer, was born at Glenburne in Sussex, about 1700, as is conjectured; and educated at Headley-school. In 1730 he published a poem called *Mount Caburn*, dedicated to the dukes of Newcastle; in which he describes the beauties of his native country, and celebrates the virtues of his friends. When lord Hardwicke was called up to the house of lords in 1734, he was chosen to succeed him in representing the borough of Seaford among the commons: and he represented this borough for the remainder of his life. He defended the measures of Sir Robert Walpole, and was the supposed author of a ministerial pamphlet, intitled, *A Letter to a Freholder on the late Reduction of the Land-tax to one Shilling in the Pound*; which had been printed in 1732. In 1735 he published *Remarks on the Laws relative to the Poor, with Proposals for their better Relief and Employment*; and at the same time brought in a bill for the purpose. He made another attempt of this kind, but without effect. In May 1738, he was appointed a commissioner of the Viſtualling-office. In 1753 appeared *Religio Philosophi*; or, the Principles of Morality and Christianity, illustrated from a View of the Universe, and of Man's Situation in it. This was followed, in 1754, by his Essay on Deformity; in which he rallies his own imperfection in this respect with much liveliness and good humour. "Bodily deformity (says he) is very rare. Among 558 gentlemen in the House of Commons, I am the only one that is so. Thanks to my worthy constituents, who never objected to my person, and I hope never to give them

cause to object to my behaviour." The same year, he translated Hawkins Browne *De Immortalitate Animi*. In 1755, he translated and modernized some Epigrams of Martial; but survived this publication only a short time, dying June 19, the same year. A little time before, he had been appointed keeper of the Records in the Tower; and it is said that his attention and assiduity during the few months he held that office were eminently serviceable to his successors. He left a son, who inherited the imperfect form of his father. This gentleman went into the service of the East India company, where he acquired rank, fortune, and reputation; but being one of those who opposed Cossim Ally Kawn, and unfortunately falling into his hands, was, with other gentlemen, ordered to be put to death at Patna, Oct. 5, 1763.

HAYES (Charles, Esq.), a very singular person, whose great erudition was so concealed by his modesty, that his name is known to very few, though his publications are many. He was born in 1678, and became distinguished in 1704 by A Treatise of Fluxions, folio: the only work to which he ever set his name. In 1710 came out a small 4to pamphlet of 19 pages, intitled, A new and easy Method to find out the Longitude, from observing the Altitudes of the Celestial Bodies: and, in 1723, The Moon, a Philosophical Dialogue; tending to show, that the moon is not an opaque body, but has original light of her own. During a long course of years, the management of the late Royal African company lay in a manner wholly upon Mr. Hayes, he being annually either sub-governor or deputy-governor; notwithstanding which, he continued his pursuit after general knowledge. To a skill in the Greek and Latin as well as modern languages, he added the knowledge of the Hebrew; and published several pieces relating to the translation and chronology of the scriptures. The African company being dissolved in 1752, he retired to Down in Kent, where he gave himself up to study. In May 1753 he began to compile in Latin his *Chronographia Asiatica & Ægyptiaca*, which he lived to finish, but not to publish; which, however, was published afterwards. In August 1758 he left his house in Kent, and took chambers in Gray's-Inn, where he died December 18, 1760, in his 82d year. The title of his posthumous works runs thus: *Chronographiæ Asiaticæ & Ægyptiæ Specimen*; in quo, 1. *Origo Chronologiæ LXX Interpretum investigatur*. 2. *Conspectus totius operis exhibetur*, 8vo.

HAYS, particular nets for taking rabbits, hares, &c. common to be bought in shops that sell nets, and they may be had larger or shorter as you think fit: from 15 to 20 fathoms is a good length, and for depth a fathom. As rabbits often straggle abroad about mid-day for fresh grass, where you perceive a number gone forth to any remote brakes or thickets, pitch two or three of these hays about their burrows; lie close there: but in case you have not nets enough to inclose all their burrows, some may be stopped up with stones, &c. Then set out with the coney-dog to hunt up and down at a good distance, and draw on by degrees to the man who is with you, and lies close by the hay, who may take them as they bolt into it.

HAYWARD, the person who keeps the common herd or cattle of a town. He is appointed by the lord's court; and his office is to see that the cattle neither break nor crop the hedges of inclosed grounds.

HAYWARD (Sir John), an eminent English historian and biographer in the beginning of the 17th century, was educated in the university of Cambridge, where he took the degree of doctor of laws. In 1610 he was appointed one of the historiographers of a college then at Chelsea; and, in 1619, received the honour of knighthood. He wrote, 1. The lives of the three Norman kings of England, William I. and II. and Henry I. 2. The first part of the life and reign of king Henry IV. 3. The life and reign of king Edward VI.; and several theological works. He died in 1627.

HAZARD, or CHANCE, in gaming. See GAMING.

HAZARD, a game on dice, without tables, is very properly so called; since it speedily makes a man, or undoes him. It is played with only two dice; and as many may play at it as can stand round the largest round table. Two things are chiefly to be observed, viz. *main* and *chance*; the latter belonging to the caster, and the former, or main, to the other gamblers. There can be no main thrown above nine, nor under five; so that five, six, seven, eight, and nine, are the only mains flung at hazard. Chances and nicks are from four to ten: thus four is a chance to nine, five to eight, six to seven, seven to six, eight to five; and nine and ten a chance to five, six, seven, and eight: in short, four, five, six, seven, eight, nine, and ten, are chances to any main, if any of these nick it not. Now nicks are either when the chance is the same with the main, as five and five, or the like; or six and twelve, seven and eleven, eight and twelve. Here observe, that twelve is out to nine, seven, and five; eleven is out to nine, eight, six, and five: and ames-ace and duce-ace are out to all mains whatever.

HAZLE, or HAZEL, in botany. See CORYLUS. The kernels of the fruit have a mild, farinaceous, oily taste, agreeable to most palates. Squirrels and mice are fond of them, as well as some birds, such as jays, nutcrackers, &c. A kind of chocolate has been prepared from them, and there are instances of their having been formed into bread. The oil expressed from them is little inferior to the oil of almonds; and is used by painters and by chemists for receiving and retaining odours. The charcoal made of the wood is preferred by painters for drawing. Some of the Highlanders, where superstition is not totally subsided, look upon the tree itself as unlucky; but are glad to get two of the nuts naturally conjoined, which is a good omen. These they call *cho-chomlaich*, and carry them as an efficacious charm against witchcraft. Evelyn tells us, that no plant is more proper for thickening of copes than the hazle, for which he directs the following expeditious method. Take a pole of hazle (ash or poplar may also be used) of 20 or 30 feet in length, the head a little lopped into the ground, giving it a chop near the ground to make it succumb; this fastened to the earth with a hook or two, and covered with some fresh mould at a competent depth (as gardeners lay their carnations), will produce a great number of suckers, and thicken and furnish a copse speedily.

HAZLE-EARTH, or Hazley-Earth, a kind of red loam, which is said to be an excellent mixture with other sorts of earth; uniting what is too loose, cooling what is too hot, and gently retaining the moisture.

Witch-HAZEL. See HAMAMALIS.

HEAD, the uppermost or superior part of the body of an animal. See ANATOMY, p. 163.

HEAD ACH, a most troublesome sensation in the head, produced by various causes, and attended with different symptoms, according to its different degrees and the place where it is seated. See MEDICINE.

Dragon's HEAD, in astronomy, is the ascending node of the moon or other planet.

HEAD of a Ship, an ornamental figure erected on the continuation of a ship's stem, as being expressive of her name, and emblematical of war, navigation, commerce, &c. The term *bead* is also used in a more enlarged sense to signify the whole front or forepart of the ship, including the bows on each side. The head therefore opens the column of water through which the ship passes when advancing. Hence we say, head-fails, head-sea, head-way, &c.

Thus, fig. 1. Plate 3. represents one side of the fore-part or head of a 74 gun ship, together with part of the bow, keel, and gunnel. The names of the several pieces, exhibited therein, are as follow: A A Fore-part of the keel, with a a The two false keels beneath it. A C The stem. a a The cat-head. b b

The supporter of the cat-head. *cc* The knight-head, or bollard-timber, of which there is one on each side, to secure the inner end of the bowsprit. *dd* The haufe holes. *ee* The naval-hoods, *i. e.* thick pieces of plank laid upon the bow to strengthen the edges of the haufe-holes. *f* The davit-chock, by which the davit is firmly wedged while employed to fish the anchor. *gg* The bulk-head, which terminates the forecasse on the fore-side, being called the *beak-head bulk-head* by shipwrights. *H* The gun-ports of the lower deck. *b* The gun-ports of the upper deck and forecasse. *II* The channels, with their dead eyes and chain plates. *i* The gripe, or fore-foot, which unites the keel with the stem, forming a part of either. *kk* These dotted lines represent the thickness and descent of the different decks from the fore-part of the ship towards the middle. The lowest of the three dotted lines *l* expresses the convexity of the beams, or the difference between the height of the deck in the middle of its breadth and at the ship's side. This is also exhibited more clearly in the *MIDSHIP-FRAME*; where the red curve of the beam is delineated. (N. B. These lines must be always parallel to the lines which terminate the gun-ports above and below.) *mm* The timbers of the head, and part of the bowsprit. *XX* The rails of the head which lie across the timbers. *QZ* Fore-part of the main wale. *RX* Fore part of the channel-wale. *UC* The load water line.

Fig. 2. Represents a head-view of a ship, with the projection of her principal timbers, and all her planks laid on one side. It is evident that the fore-part of a ship is called its *head*, from the affinity of motion and position it bears to a fish, and in general to the horizontal situation of all animals whilst swimming.

By the *HEAD*; the state of a ship, which is laden deeper at the fore-end than the after-end.

HEAD Borow, or *HEAD-Borough*, signifies the person who is the chief of the frank-pledge, and had anciently the principal direction of those within his own pledge. He was also called *burrow-head*, *burshoulder*, now *borsholder*, *third-borow*, *tytbing-man*, *chief-pledge*, and *borow elder*, according to the diversity of speech in different places. This office is now usually called a *high-constable*. The head-borow was the chief of ten pledges: the other nine were called *band-lorows*, or *plegii manuales*, &c.

HEAD-Mould-shot, a disease in children, wherein the futures of the skull, generally the coronal, *ride*; that is, have their edges shot over one another; and are so close locked together, as to compress the internal parts, the meninges, or even the brain itself. The disease is supposed to occasion convulsions, and to admit of no cure, unless room could be given by manual operation or a divulsion of the futures. The head mould-shot is the disorder opposite to the horse-shoe head.

HEAD-PENCE, an exaction of a certain sum formerly collected by the sheriff of Northumberland from the inhabitants of that county, without any account to be made to the king. This was abolished by the statute 23 Hen. VI. cap. 7.

HEAD-Tin, in metallurgy, is a preparation of tin-ore toward the fitting it for working into metal. When the ore has been pounded and twice washed, that part of it which lies uppermost, or makes the surface of the mass in the tub, is called the *head tin*; this is separated from the rest, and after a little more washing becomes fit for the blowing-house.

HEAD-Taft, a rope employed to fasten a ship to a wharf, chain, or buoy, or to some other vessel along-side.

HEAD-Land, a name frequently given to a cape or promontory.

HEAD-Dress, amongst the Jewish, Grecian, and Roman ladies, as among ourselves, was various, according to the different periods of time, and the fluctuation of fashion. In general, it principally consisted of their hair differently tricked out. It was usually divided before, with a bodkin, into two equal parts; sometimes it was covered with a net, or put into a kind of purse, or tied behind in the form of a knot, or bound back

and plaited with ribbands. It was washed with great care; essence and perfumes were applied to it, and gold-dust sometimes made use of as powder. Pearls and jewels made a part of their ornaments; and pendants were worn in the ear. To cover the defect of hair, perukes were made use of by the gentlemen of Rome. And we read that Otho had a covering of false hair, because he had not much of his own. See *HAIR*, and *JEWELS*. Both the Grecian and Roman ladies wore *têtes*.

HEADMOST, the situation of any ship or ships which are the most advanced in a fleet, or line of battle.

HEAD Rope, that part of the bolt-rope which terminates any of the principal sails on the upper edge, which is accordingly sewed thereto. See the article *BOLT-ROPE*.

HEAD-Sails, a general name for all those sails which are extended on the fore-mast and bowsprit, and employed to command the fore-part of the ship: such are the fore-sail, fore-top-sail, fore-top gallant sail, jib, fore stay-sail, and the spirit-sail with its top-sail. This term is used in opposition to *after-sails*, viz. all those which are extended on the mizen-mast, and on the stays between the mizen and main-masts.

HEAD-to-wind; the situation of a ship or boat, when her head is turned to windward.

HEAD-Way, the motion of advancing at sea. It is generally used when a ship first begins to advance; or when it is doubtful whether she is in a state of rest or motion. It is in both senses opposed to retreating, or moving with the stern foremost. See the article *STERNWAY*.

HEALFANG, *HEALSFANG*, or *HALSFANG*, in our ancient customs, signifies *collisfrigium*, or "the punishment of the pillory." The word is compounded of two Saxon words; *halp* "neck," and *fangen* "to contain:" *Pœna scilicet qua alicui collum stringatur*. The healfang, however, cannot signify a pillory in the charter of Canutus, De Forestis, cap. xiv. *Et pro culpa solvat regi duos solidos, quos Dani vocant halfsehang*.

HEALFANG is also taken for a pecuniary punishment or mulct, to commute for standing in the pillory; and is to be paid either to the king or the chief lord. *Qui falsum testimonium dedit, reddat regi vel terræ domino healfang*.

HEALING, in its general sense, includes the whole process of curing or removing a disorder, and recovering health. In this sense medicine is defined the art of healing. In its more restrained sense, as used in surgery, &c. healing denotes the uniting or consolidating the lips of a wound or ulcer.

HEALING, in architecture, denotes the covering the roof of a building. The healing is various; as of lead, tiles, slate, Horshamstone, shingles, or reed and straw.

HEALTH, is a right disposition of the body, and of all its parts; consisting in a due temperature, a right conformation, just connection, and ready and free exercise of the several vital functions. Health admits of latitude, as not being the same in all subjects, who may yet be said to enjoy health. That part of medicine which shows the means of preserving health, is termed *hygieine*. See *MEDICINE*. The Greeks and Romans deified Health, representing it under the figure of a woman, whom they supposed to be the daughter of *Æsculapins*. We find the name of the goddess *Salus*, or Health, on many medals of the Roman emperors, with different inscriptions; as, *SALUS PUBLICA*, *SALUS REIPUBLICÆ*, *SALUS AUGUSTI*, &c.

HEAM, in beasts, denotes the same with *after-birth* in women. Thyme, penny-royal, winter-savory, and common horehound, boiled in white-wine, and given to a mare, are esteemed good to expel the heam.

HEARING, the act or faculty of perceiving sounds. Hearing is reckoned among our external senses. Its organ is the ear, and particularly the auditory nerve diffused through the same; and its object, certain motions or vibrations of the air. Hence hearing may be more scientifically defined, a sensation, whereby, from a due motion impressed on the fibrillæ of the auditory

nerve, and communicated thence to the sensory, the mind perceives and gets the idea of sounds. See ANATOMY, p. 211.

HEARING in different animals. See COMPARATIVE-ANATOMY, ENTOMOLOGY, and ICHTHYOLOGY.

HEARNE (Thomas), a celebrated antiquarian, eminent for his writings and editions of MSS. His father was parish-clerk of Little Waltham in Berkshire, where he was born in 1680. He had a liberal education under the patronage of a neighbouring gentleman; and even from a boy discovered a strong propensity to the study of antiquities. He rendered great services to the Bodleian library, and died in 1735.

HEARSE, among hunters, a hind in the second year of her age. See HUNTING.

HEARSE is the name of a well known carriage, used for conveying the dead to the grave. The word is also used by Shakespeare in his Henry VI. for a monument erected over a grave.

HEART, in anatomy, the most important of the viscera in the human body. It is situated in the thorax, on the anterior part of the diaphragm, between the two laminæ of the mediastinum. The veins all terminate in it, and from it all the arteries arise; and, by its alternate contraction and dilatation, it becomes the chief instrument of the circulation of the blood, and the organ of life. See ANATOMY, page 193.

Philosophers have, from time to time, attempted to make estimates of the force of the blood in the heart and arteries; but they have as widely differed from each other, as they have from the truth, for want of a sufficient number of data to argue upon. This set the truly ingenious Dr. Hales upon making proper experiments, in order to ascertain the force of the blood in the veins and arteries of several animals. If, according to Dr. Keil's estimate, the left ventricle of a man's heart throws out in each systole an ounce or 1.638 cubic inches of blood, and the area of the orifice of the aorta be = 0.4187, then

dividing the former by this, the quotient 3.9 is the length of the cylinder of blood which is formed in passing through the aorta in each systole of the ventricle; and in the 75 pulses of a minute, a cylinder of 292.5 inches in length will pass: this is at the rate of 1462 feet in an hour. But the systole of the heart being performed in one third of this time, the velocity of the blood in that instant will be thrice as much, viz. at the rate of 4386 feet in an hour, or 73 feet in a minute. And if the ventricle throws out one ounce in a pulse, then in the 75 pulses of a minute, the quantity of blood will be equal to 4.4lb. 11oz. and, in 34 minutes, a quantity equal to a middle-sized man, viz. 158 lb. will pass through the heart. But if, with Dr. Harvey and Dr. Lower, we suppose two ounces of blood; that is, 3.276 cubic inches, to be thrown out at each systole of the ventricle, then the velocity of the blood in entering the orifice of the aorta will be double the former, viz. at the rate of 146 feet in a minute, and a quantity of blood equal to the weight of a man's body will pass in half the time, viz. 17 minutes.

If we suppose, what is probable, that the blood will rise $7 + \frac{1}{2}$ feet high in a tube fixed to the carotid artery of a man, and that the inward area of the left ventricle of his heart is equal to 15 square inches, these multiplied into $7 + \frac{1}{2}$ feet, give 1350 cubic inches of blood, which presses on that ventricle, when it first begins to contract, a weight equal to 15.5 pounds.

What the doctor thus calculates, from supposition, with regard to mankind, he actually submitted to experiment in horses, dogs, fallow-dees, &c. by fixing tubes in orifices opened in their veins and arteries; by observing the several heights to which the blood rose in these tubes, as they lay on the ground; and by measuring the capacities of the ventricles of the heart and orifices of the arteries. And, that the reader may the more readily compare the said estimates together, he has given a table of them, ranged in the following order.

The several animals.		Weight of each.		Height of the blood in the tube from the jugular vein.		Height of the blood in tubes fixed to arteries.		Capacity of the left ventricle of the heart.		Area of the orifice of the aorta.		Velocity of the blood in the aorta.		Quantities of blood equal to the weight of the animal, in what time.		How much in a minute.		Weight of the blood sustained by the left ventricle contracting.		No. of pulses in a minute.		Area of transverse section of descending aorta.		Area of the transverse section of ascending aorta.	
		Pounds.	Ounces.	Inches.		Feet.	Inches.	Cubic inches.	Square inches.	Feet and inches in a minute.		Minutes.	Pounds.	Pounds.		Square inches.			Square inches.			Square inches.			
Man		160		On straining.		7	6	1.659	0.4187	56.55	34.18		4.38	51.5	75										
Horse	1ft.					8	3	3.318		113.3	17.5		9.36												
	2d.					9	8																		
	3d.	825		12	52	9	6	10	1.036	86.85	60		13.75	113.22	86	0.677									
Ox		1600						12.5	1.539	76.95	88		18.14		38	0.912									
Sheep																									
Doe		91		5½	9	6	5½	1	85	0.172	174.5	20	4.593	36.56	65	0.094									
						4	2	9	0.476							0.383									
Dogs	1ft.	52		0	6	6	8	1.172	0.196	144.77	11.9		4.34	33.61	97	0.106									
	2d.	24		5	7	2	8	1	0.185	130.9	6.48		3.7			0.102									
	3d.	18		5		4	8	0.633	0.118	130	7.8		2.3	19.8		0.07									
	4th.	12	8	4		3	3	0	5	0.101	120	6.7	1.85	11.1		0.061									
																			</						

HEART-burn, a disease usually called *cardialgia* by physicians. In surfeits, or upon swallowing without due mastication; when meats are eat tough and fat, or with farinaceous substances unfermented; or when by any accident the saliva is not intimately mixed with the food, the stomach swells with air; and this extraordinary commotion being attended with an unusual heat, brings on the uneasiness called the *heart-burn*; which is remedied by whatever promotes a greater secretion of saliva, or helps to mix it with our aliment. Magnesia, or the testaceous powders, as oyster-shells, crabs eyes, chalk, &c. are the usual remedies for this complaint.

HEARTH, that part of the floor or pavement of a room on which the fire is immediately placed.

HEARTH-Money. See *CHIMNEY-Money*.

HEAT, the opposite to cold, being a relative term denoting the property of fire, or of those bodies we denominate hot; being in us a sensation excited by the action of fire. See *CHEMISTRY*, p. 372, 373, &c. Heat, as it exists in the hot body, or that which constitutes and denominates a body hot, and enables it to produce such effects on our organs, is variously considered by the philosophers; some making it a quality, others a substance, and others only a mechanical affection. The former principle is laid down by Aristotle and the Peripatetics. While the Epicureans, and other corpuscularians, define heat not as an accident of fire, but as an essential power or property of it, the same in reality with it, and only distinguished from it in the manner of our conception. So that heat, on their principles, is no other than the volatile substance of fire itself, reduced into atoms, and emitted in a continual stream from ignited bodies; so as not only to warm the objects within its reach, but also, if they be inflammable, to kindle them, turn them into fire, and conspire with them to make flame. In effect, these corpuscles, say they, flying off from the ignited body, constitute fire while yet contained within the sphere of its flame; but when fled, or got beyond the same, and dispersed every way, so as to escape the apprehension of the eye, and only to be perceived by the feeling, they take the denomination of heat, inasmuch as they excite in us that sensation. The Cartesians, improving on this doctrine, assert that heat consists in a certain motion of the insensible particles of a body, resembling the motion by which the several parts of our body are agitated by the motion of the heart and blood.

Our latest and best writers of mechanical, experimental, and chemical philosophy, differ very considerably about heat. The chief difference is, whether it be a peculiar property of one certain immutable body, called fire, or phlogiston, or electricity; or whether it may be produced mechanically in other bodies, by inducing an alteration in their particles. The former tenet, which is as ancient as Democritus, and the system of atoms, had given way to that of the Cartesians, and other mechanists; but is now with great address retrieved, and improved on, by some of the latest writers, particularly Homburg, the younger Lemery, Gravefande, Boerhaave in his lectures on fire, Black, Crawford, and other chemical philosophers.

The thing called fire, according to Boerhaave, is a body sui generis, created such ab origine, unalterable in its nature and properties, and not either producible de novo from any other body, nor capable of being reduced into any other body, or of ceasing to be fire. This fire, he contends, is diffused equally every where, and exists alike, or in equal quantity, in all the parts of space, whether void, or possessed by bodies; but that naturally, and in itself, it is perfectly latent and imperceptible; being only discovered by certain effects which it produces, and which are cognizable by our senses. These effects are heat, light, colour, rarefaction, and burning, which are all indications of fire, as being none of them producible by any other cause: so that wherever we observe any of these, we may safely infer the

action and presence of fire. But though the effect cannot be without the cause, yet the fire may remain without any of these effects; any, we mean, gross enough to affect our senses, or become objects of them: and this, he adds, is the ordinary case; there being a concurrence of other circumstances, which are often wanting, necessary to the production of such sensible effects.

The mechanical philosophers, particularly Bacon, Boyle, and Newton, conceive otherwise of Heat; considering it not as an original inherent property of any particular sort of body; but as mechanically producible in any body. The former, in an express treatise *De Forma Calidi*, from a particular enumeration of the several phenomena and effects of heat, deduces several general properties of it; and hence he defines heat, an expansive undulatory motion in the minute particles of the body; by which they tend, with some rapidity, towards the circumference, and at the same time incline a little upwards.

Mr. Boyle, in a Treatise on the Mechanical Origin of Heat and Cold, strongly supports the doctrine of the producibility of heat, with new observations and experiments; as in the instance of a smith briskly hammering a small piece of iron, which, though cold before, soon becomes exceedingly hot.

This system is also farther supported by Newton, who does not conceive fire as any particular species of body, originally endued with such and such properties. Fire, according to him, is only a body much ignited, that is heated hot, so as to emit light copiously: what else, says he, is red-hot iron but fire? and what else is a burning charcoal but red-hot wood? or flame itself, but red-hot smoke? It is certain that flame is only the volatile part of the fuel heated red-hot, i. e. so hot as to shine; and hence only such bodies as are volatile, that is, such as emit a copious fume, will flame; nor will they flame longer than they have fume to burn. In distilling hot spirits, if the head of the still be taken off, the ascending vapours will catch fire from a candle, and turn into a flame. And in the same manner several bodies, much heated by motion, attrition, fermentation, or the like, will emit lucid fumes, which, if they be copious enough, and the heat sufficiently great, will be flame; and the reason why fused metals do not flame, is the smallness of their fume; this is evident, because spelter, which fumes most copiously, does likewise flame. Add, that all flaming bodies, as oil, tallow, wax, wood, pitch, sulphur, &c. by flaming, waste and vanish into burning smoke. And do not all fixed bodies, when heated beyond a certain degree, emit light, and shine? and is not this emission performed by the vibrating motion of their parts? and do not all bodies, which abound with terrestrial and sulphureous parts, emit light as often as those parts are sufficiently agitated, whether that agitation be made by external fire, or by friction, or percussion, or putrefaction, or by any other cause? Thus, sea water, in a storm; quicksilver agitated in vacuo; the back of a cat, or the neck of a horse, obliquely rubbed in a dark place; wood, flesh, and fish, while they putrefy; vapours from putrefying waters, usually called *ignes fatni*; stacks of moist hay or corn; glow-worms; amber and diamonds by rubbing; fragments of steel struck off with a flint, &c. all emit light. Are not gross bodies and light convertible into one another? and may not bodies receive much of their activity from the particles of light which enter their composition? I know no body less apt to shine than water; and yet water, by frequent distillations, changes into fixed earth, which, by a sufficient heat, may be brought to shine like other bodies.

Add, that the sun and stars, according to Newton's conjecture, are no other than great earths vehemently heated: for large bodies, he observes, preserve their heat the longest, their parts heating one another; and why may not great, dense, and fixed bodies, when heated beyond a certain degree, emit light so copiously, as by the emission and reaction of it, and the

reflections and refractions of the rays within the pores, to grow still hotter, till they arrive at such a period of heat as is that of the sun? Their parts also may be farther preserved from summing away, not only by their fixity, but by the vast weight and density of their atmospheres incumbent on them, thus strongly compressing them, and condensing the vapours and exhalations arising from them. Hence we see warm water, in an exhausted receiver, shall boil as vehemently as the hottest water open to the air: the weight of the incumbent atmosphere, in this latter case, keeping down the vapours, and hindering the ebullition, till it has conceived its utmost degree of heat. So also a mixture of tin and lead, put on a red-hot iron in vacuo, emits a fume and flame; but the same mixture in the open air, by reason of the incumbent atmosphere, does not emit the least sensible flame.

Thus much for the system of the producibility of heat.

On the other hand, M. Homberg, in his *Essai du Soufre Principe*, holds, that the chemical principle or element, sulphur, which is supposed one of the simple, primary, pre-existent ingredients of all natural bodies, is real fire; and consequently that fire is co-eval with body. *Mem. de l'Acad. an. 1705.*

Dr. Gravesande goes upon much the same principle. According to him, fire enters the composition of all bodies, is contained in all bodies, and may be separated or procured from all bodies, by rubbing them against each other, and thus putting their fire in motion. But fire, he adds, is by no means generated by such motion. *Elem. Phys. tom. 2, cap. 1.* Heat, in the hot body, he says, is an agitation of the parts of the body, made by means of the fire contained in it; by such agitation a motion is produced in our bodies, which excites the idea of heat in our minds: so that heat, in respect of us, is nothing but that idea, and in the hot body nothing but motion. If such motion expel the fire in right lines, it may give us the idea of light; if in a various and irregular motion, only of heat.

Lemery, the younger, agrees with these two authors, in asserting this absolute and ingenerable nature of fire; but he extends it farther. Not contented with confiding it as an element to bodies, he endeavours to shew, that it is equally diffused through all space: that it is present in all places, even in the void spaces between the bodies, as well as in the insensible interstices between their parts. And this last sentiment falls in with that of Boerhaave above delivered. *Mem. de l'Acad. an. 1713.*

Philosophers have lately distinguished heat into absolute, and sensible. By absolute heat, or fire, they mean that power or element which, when it is in a certain degree, excites in animals the sensation of heat; and by sensible heat, the same power considered in its relation to the effects which it produces: thus, two bodies are said to have equal quantities of sensible heat, when they produce equal effects upon the mercury in the thermometer; but as bodies of different kinds have different capacities for containing heat, the absolute heat in such bodies will be different, though the sensible heat be the same. Thus, a pound of water and a pound of antimony, of the same temperature, have equal sensible heat; but the former contains a much greater quantity of absolute heat than the latter.

M. De Luc has evinced, by a variety of experiments, that the expansions of mercury between the freezing and boiling points of water, correspond precisely to the quantities of absolute heat applied, and that its contractions are proportionable to the diminution of this element within these limits. And from hence it may be inferred, that if the mercury were to retain its fluid form, its contractions would be proportionable to the decrements of the absolute heat, though the diminution were continued to the point of total privation. But the comparative quantities of absolute heat, which are communicated to different bodies, or separated from them, cannot be determined in a direct manner by the thermometer.

Some philosophers have apprehended that the quantities of absolute heat in bodies, are in proportion to their densities. While others, as Boerhaave, imagined that heat is equally diffused through all bodies, the densest as well as the rarest, and therefore that the quantities of heat in bodies are in proportion to their bulk or magnitude: and, at his desire, Fahrenheit attempted to determine the fact by experiment. For this purpose, he took equal quantities of the same fluid, and gave them different degrees of heat; then, upon mixing them intimately together, he found that the temperature of the mixture was a just medium, or arithmetical mean, between the two. But if this experiment be made with water and mercury, in the same circumstances, viz. in equal bulks, the result will be different, as the temperature of the mixture will not be a mean between the two, but always nearer to that of the water than to the quicksilver; so that, when the water is the hotter, the temperature of the mixture is above the mean, and below it when the water is the colder. And from experiments of this kind it has been inferred, that the comparative quantities of the absolute heats of these fluids, are reciprocally proportional to the changes which are produced in their sensible heats, when they are mixed together at different temperatures: and this fact has been publicly taught, for several years, by Dr. Black, and Dr. Irvine, in the universities of Edinburgh and Glasgow. This rule, however, does not apply to those substances which, in mixture, excite sensible heat by chemical action.

From the experiments and reasoning employed by Dr. Crawford, it more fully appears, that the quantities of absolute heat in different bodies, are not as their densities; or that equal weights of heterogeneous substances, as air and water, having the same temperature, may contain unequal quantities of absolute heat: he also shews, that if phlogiston be added to a body, a quantity of the absolute heat of that body will be extricated; and if the phlogiston be separated again, an equal quantity of heat will be absorbed. So that heat and phlogiston appear to be two opposite principles in nature. But this ingenious writer has not presumed absolutely to decide the question that has been long agitated, whether heat be a substance or a quality.—He inclines to the former opinion however, and observes, that if we adopt the opinion, that heat is a distinct substance, or an element sui generis, the phenomena will be found to admit of a simple and obvious interpretation, and to be perfectly agreeable to the analogy of nature. See Crawford's *Experiments and Observations on Animal Heat and the Inflammation of Combustible Bodies.*

Animal HEAT. The heat of animals is very various, both according to the variety of their kinds, and the difference of the seasons: accordingly, zoologists have divided them into hot and cold blooded, reckoning those to be hot that are near or above our own temperature, and all others cold whose heat is below ours, and consequently affect us with the sense of cold; thus making the human species a medium between the hot and cold blooded animals, or at least the lowest order of the hot blooded.

The heat of the human body, in its natural state, according to Dr. Boerhaave, is such as to raise the mercury in the thermometer to 92° or at most to 94°; and Dr. Piteairn makes the heat of the human skin the same. Indeed it is evident that different parts of the human body, and its different states, as well as the different seasons, will make it shew of different temperatures. Thus, by various experiments at different times, the heat of the human body is made various by the following authors:

Boerhaave and Piteairn	-	-	92°
Amontons	-	-	91, 92, or 93
Sir Isaac Newton	-	-	95½
Fahrenheit and Musschenbroek, the blood,	-	-	96
Dr. Martine, the skin	-	-	97, or 98
—————, the urine	-	-	99

Dr. Hales, the skin	-	-	-	97°
-----, the urine	-	-	-	103
Mr. John Hunter, under his tongue,	-	-	-	97
-----, in his rectum	-	-	-	98½
-----, his urethra at 1 inch,	-	-	-	92
at 2 inches,	-	-	-	93
at 4 inches,	-	-	-	94
the ball of the thermom. at the bulb of the urethra	-	-	-	97

For the powers of animals to bear various degrees of Heat, see the *Philos. Transf.* vol. 65, 68, &c.

There is hardly any subject of philosophical investigation that has afforded a greater variety of hypotheses, conjectures, and experiments, than the cause of animal heat. The first opinion, which has very generally obtained, is, that the heat of animal bodies is owing to the attrition between the arteries and the blood. All the observations and reasoning brought in favour of this opinion, however, only shew that the heat and the motion of the arteries are generally proportional to each other; without shewing which is the cause, and which the effect; or indeed that either is the cause or effect of the other, since both may be the effects of some other cause.

Dr. Douglas, in his *Essay on the Generation of Heat in Animals*, ascribes it solely to the friction of the globules of blood in their circulation through the capillary vessels.

Another opinion is, that the lungs are the fountain of heat in the human body: and this opinion is supported by much the same sort of arguments as the former, and seemingly to little better purpose.

A third opinion is, that the cause of animal heat is owing to the action of the solid parts upon one another. And as the heart and arteries move most, it has been thought natural to expect that the heat should be owing to this motion. But even this does not seem very plausible, from the following considerations: 1st. The moving parts, however we term them solid, are neither hard nor dry; which two conditions are absolutely requisite to make them fit to generate heat by attrition. 2d. None of their motions are swift enough to promise heat in this way. 3d. They have but little change of surface in their attritions. And 4thly. The moveable fibres have fat, mucilage, or liquors every way surrounding them, to prevent their being destroyed, or heated by attrition.

A fourth cause assigned for the heat of our bodies, is that process by which our aliment and fluids are perpetually undergoing some alteration. And this opinion is chiefly supported by Dr. Stevenson, in the *Edinburgh Medical Essays*, vol. 5, art. 77.

The late ingenious Dr. Franklin inclines to this opinion, when he says, that the fluid fire, as well as the fluid air, is attracted by plants in their growth, and becomes consolidated with the other materials of which they are formed, and makes a great part of their substance; that when they come to be digested, and to undergo a kind of fermentation in the vessels, part of the fire, as well as part of the air, recovers its fluid active state again, and diffuses itself on the body digesting and separating it; &c. *Exper. and Obs. on Electricity*, p. 346.

Dr. Mortimer thinks the heat of animals explicable from the phosphorus and air they contain. Phosphorus exists, at least in a dormant state, in animal fluids; and it is also known that they all contain air: it is therefore only necessary to bring the phosphoreal and aerial particles into contact, and heat must of consequence be generated; and were it not for the quantity of aqueous humours in animals, fatal accensions would frequently happen. See *Philos. Transf.* number 476.

Dr. Black supposes, that animal heat is generated altogether in the lungs, by the action of the air on the principle of inflammability, and is thence diffused over the rest of the body by means of the circulation. But Dr. Leslie urges several arguments against this hypothesis, tending to show that it is repug-

nant to the known laws of the animal machine; and he advances another hypothesis, instead of it, viz. that the subtle principle, by chemists termed phlogiston, which enters into the composition of natural bodies, is in consequence of the action of the vascular system gradually evolved through every part of the animal machine, and that during this evolution heat is generated. This opinion, he candidly acknowledges, was first delivered by Dr. Duncan of Edinburgh; and that something similar to it is to be found in Dr. Franklin's works, and in a paper of Dr. Mortimer's in the *Philosophical Transactions*.

The last hypothesis we shall mention, is the very plausible one of Dr. Crawford, lately published in his *Experiments and Observations on Animal Heat*. This ingenious gentleman has inferred, from a variety of experiments, that heat and phlogiston, so far from being connected, as most philosophers have imagined, act in some measure in opposition to each other. By the action of heat on bodies, the force of their attraction of phlogiston is diminished, and by the action of phlogiston, a part of their absolute heat is expelled. He has also demonstrated, that atmospheric air contains a greater quantity of absolute heat than the air which is expired from the lungs of animals: he makes the proportion of the absolute heat of atmospheric air, to that of fixed air, as 67 to 1; and the heat of dephlogisticated air to that of atmospheric air as 4.6 to 1; and observing that Dr. Priestley has proved, that the power of this dephlogisticated air in supporting animal life is 5 times as great as that of atmospheric air, he concludes that the quantity of absolute heat contained in any kind of air fit for respiration, is very nearly in proportion to its purity or to its power of supporting animal life; and since the air exhaled by respiration is found to contain only the 67th part of the heat which was contained in the atmospheric air, previous to inspiration, it is very reasonably inferred, that the latter must necessarily deposit a very great proportion of its absolute heat in the lungs. Dr. Crawford has also shown, that the blood which passes from the lungs to the heart by the pulmonary vein, contains more absolute heat than that which passes from the heart to the lungs by the pulmonary artery; the absolute heat of florid arterial blood being to that of venous blood as 11½ to 10: therefore, since the blood which is returned by the pulmonary vein to the heart has the quantity of its absolute heat increased, it must have acquired this heat in its passage through the lungs; so that in the process of respiration a quantity of absolute heat is separated from the air, and absorbed by the blood. Dr. Priestley has also proved, that, in respiration, phlogiston is separated from the blood, and combined with air.

This theory however has been contested and disputed, and it has been said, Dr. Crawford's experiments repeated, with contrary results; though no regular and systematical theory has yet been formed in its stead.

HEAT of Combustible and Inflammable Bodies. Dr. Crawford's theory with respect to the inflammation of combustible bodies, is founded on the same principles as his doctrine concerning the heat of animals. According to him, the heat which is produced by combustion, is derived from the air, and not from the inflammable body. Inflammable bodies, he says, abound with phlogiston, and contain little absolute heat: the atmosphere, on the contrary, abounds with absolute heat, and contains little phlogiston. In the process of inflammation, the phlogiston is separated from the inflammable body, and combined with the air; the air is phlogisticated, and gives off a great proportion of its absolute heat, which, when extricated suddenly, bursts forth into flame, and produces an intense degree of sensible heat. And since it appears by calculation, that the heat produced by converting atmospheric into fixed air, is such, if it were not dissipated, as would be sufficient to raise the air so changed to more than 12 times the heat of red-hot iron, it fol-

shows, that in the process of inflammation a very great quantity of heat is derived from the air. But, on the contrary, no part of the heat can be derived from the combustible body; because this body, during the inflammation, being deprived of its phlogiston, undergoes a change similar to that of the blood by the process of respiration, in consequence of which its capacity of containing heat is increased; and therefore it will not give off any part of its absolute heat, but, like the blood in its passage through the lungs, it will absorb heat.

A similar theory of heat has lately been published by Mr. Elliot. See his *Philosophical Observations on the Senses of Vision and Hearing*; to which is added, an *Essay on Combustion and Animal Heat*, 8vo, 1780.

HEAT, in geography, is that which relates to the earth. There is a great variety in the heat of different places and seasons. Naturalists have commonly laid it down, that the nearer any place is to the centre of the earth, the hotter it is found: but this does not hold strictly true; and if it were, the effect might be otherwise accounted for, and more satisfactorily, than from their imagined central fire.

Mr. Boyle, who had been at the bottom of some mines himself, with more probability suspects that this degree of heat, at least in some of them, may arise from the peculiar nature of the minerals there produced. And he instances a mineral of the vitriolic kind, dug up in large quantities, in several parts of England, which, by the bare affusion of common water, will grow so hot as almost to take fire. To which may be added, that such places, in the bowels of the earth, usually feel hot, from the confined and stagnant state of the air in them, in which the heat is retained, through the want of a current or change of air to carry the heat off.

On the other hand, on ascending high mountains, the air grows more and more cold and piercing. Thus, the tops of the Pike of Teneriffe, the Alps, and several other mountains, even in the most sultry countries, are found always invested with snow and ice, which the heat is never sufficient to thaw. In some of the mountains of Peru there is no such thing as running water, but all ice: plants vegetate a little about the bottom of the mountains, but near the top no vegetable can live, for the intenseness of the cold. This effect is attributed to the thinness of the air, and the little surface of the earth there is to reflect the rays, as well as the great distance of the general surface of the earth which reflects the rays back into the atmosphere.

As to the diversity in the heat of different climes and seasons, it arises from the different angles under which the sun's rays strike upon the surface of the earth. In the *Philos. Trans.* Abr. vol. 2, p. 165, Dr. Halley has given a computation of this heat, on the principle, that the simple action of the sun's rays, like other impulses or strokes, is more or less forcible, according to the sines of the angles of incidence, or to the sines of the sun's altitudes, at different times or places.

Hence it follows, that, the time of continuance, or the sun's shining on any place, being taken for a basis, and the sines of the sun's altitudes perpendicularly erected upon it, and a curve line drawn through the extremities of those perpendiculars, the area thus comprehended will be proportional to the collection of all the heat of the sun's beams in that space of time.

Hence it will likewise follow, that, at the pole, the collection of all the heat of a tropical day, is proportional to the rectangle or product of the sine of $23\frac{1}{2}$ degrees in 24 hours, or the circumference of a circle, or as $\frac{8}{75}$ into 12 hours, the sine of $23\frac{1}{2}$ degrees being nearly $\frac{4}{75}$ of radius. Or the polar heat will be equal to that of the sun continuing 12 hours above the horizon at 53 degrees height; and the sun is not 5 hours more elevated than this under the equinoctial.

But as it is the nature of heat to remain in the subject, after

the luminary is removed, and particularly in the air, under the equinoctial the 12 hours absence of the sun abates but little from the effect of his heat in the day; but under the pole, the long absence of the sun for 6 months has so chilled the air, that it is in a manner frozen; and after the sun has risen upon the pole again, it is long before his beams can make any impression, being obstructed by thick clouds and fogs.

From the foregoing principle Dr. Halley computes the following table, exhibiting the heat to every 10th degree of latitude, for the equinoctial and tropical sun, and from which an estimate may easily be made for the intermediate degrees.

Lat.	Sign that the Sun is in.		
	γ or α	φ	ψ
0	20000	18341	18341
10	19696	20290	15834
20	18794	21737	13166
30	17321	22651	10124
40	15321	23048	6944
50	12855	22991	3798
60	10000	22773	1075
70	6840	23543	0
80	3473	24673	0
90	0	25055	0

From the same principles, and table, also are deduced the following corollaries, viz.

1. That the equatorial heat, when the sun becomes vertical, is as twice the square of the radius.—2. That, at the equator, the heat is as the sine of the sun's declination.—3. That, in the frigid zones, when the sun sets not, the heat is as the circumference of a circle into the sine of the altitude at 6: and consequently that, in the same latitude, these aggregates of heat are as the sines of the sun's declination; and at the same declination of the sun, they are as the sines of the latitudes; and generally they are as the sines of the latitudes into the sines of declination.—4. That the equatorial day's heat is everywhere as the cosine of the latitude.—5. In all places where the sun sets, the difference between the summer and winter heats, when the declinations are contrary, is equal to a circle into the sine of the altitude at 6, in the summer parallel; and consequently those differences are as the rectangles of the sines of the latitude and declination.—6. The tropical sun has the least force of any at the equator; and at the pole it is greatest of all.

Many objections have been urged against this theory of Dr. Halley. Some have objected, that the effect of the sun's heat is not in the simple, but in the duplicate ratio of the sines of the angles of incidence; like the law of the impulse of fluids. And indeed, the quantity of the sun's direct rays received at any place, being evidently as the sine of the angle of incidence, or of the sun's altitude, if the heat be also proportional to the force with which a ray strikes, like the mechanical action or impulse of any body, then it will follow that the heat must be in the compound ratio of both, that is, as the square of the sine of the sun's altitude. But this last principle is here only assumed gratis, as we do not know a priori that the heat is proportional to the force of a striking body; and it is only experiment that can determine this point.

It is certain that heat communicated by the sun to bodies on the earth, depends also much upon other circumstances beside the direct force of his rays. These must be modified by our atmosphere, and variously reflected and combined by the action of the earth's surface itself, to produce any remarkable effects of heat. So that if it were not for these additional circum-

stances, it is probable the naked heat of the sun would not be very sensible.

Dr. Halley himself was well apprised, that many other circumstances, besides the direct force of the sun's rays, contributed to augment or diminish the effect of this, and the heat resulting from it, in different climates; and therefore no calculation, formed on the preceding theory, can be supposed to correspond exactly with observation and experiment. It has also been objected, that, according to the foregoing theory, the greatest heat in the same place should be at the summer solstice, and the most extreme cold at the winter solstice; which is contrary to experience. To this objection it may be replied, that heat is not produced in bodies by the sun instantaneously, nor do the effects of his heat cease immediately when his rays are withdrawn; and therefore those parts which are once heated, retain the heat for some time; which, with the additional heat daily imparted, makes it continue to increase, though the sun declines from us: and this is the reason why July is hotter than June, although the sun has withdrawn from the summer tropic; as we also find it is generally hotter at one, two, or three in the afternoon, when the sun has declined towards the west, than at noon, when he is on the meridian. As long as the heating particles, which are constantly received, are more numerous than those which fly away or lose their force, the heat of bodies must continually increase. So, after the sun has left the tropic, the number of particles, which heat our atmosphere and earth, constantly increases, because we receive more in the day than we lose at night, and therefore our heat must also increase. But as the days decrease again, and the action of the sun becomes weaker, more particles will fly off in the night-time than are received in the day, by which means the earth and air will gradually cool. Farther, those places which are well cooled, require time to be heated again; and therefore January is mostly colder than December, although the sun has withdrawn from the winter tropic, and begun to emit his rays more perpendicularly upon us.

But the chief cause of the difference between the heat of summer and winter is, that in summer the rays fall more perpendicularly, and pass through a less dense part of the atmosphere; and therefore with greater force, or at least in greater number in the same place: and besides, by their long continuance, a much greater degree of heat is imparted by day than can fly off by night.

For the calculations and opinions of several other philosophers on this head, see Keill's *Astron. lect.* 8; Ferguson's *Astron.* ch. 10; Long's *Astron.* § 777; *Mem. Acad. Scienc.* 1719.

As to the temperature or heat of our atmosphere, it may be observed, that the mercury seldom falls under 16° in Fahrenheit's thermometer; but we are apt to reckon it very cold at 24° , and it continues coldish to 40° and a little above. However, such colds have been often known as bring it down to 0° , the beginning of the scale, or nearly the cold produced by a mixture of snow and salt, often near it, and in some places below it. Thus, the degree of the thermometer has been observed at various times and places as follows:

Places.	Latit.	Year.	Thermom.
Pennsylvania	$40^{\circ} 0'$	1732	5°
Paris	$48 50$	1709 & 1710	8
Leyden	$52 10$	1729	5
Utrecht	$52 8$	—	4
London	$51 31$	1709 & 1710	0
Copenhagen	$55 43$	1709	0
Upsal	$59 56$	1732	—1
Petersburg	$59 56$	—	—28
Torneo	$65 51$	1736-7	—33
Hudson's Bay	$52 24$	1715	—37

The middle temperature of our atmosphere is about 48° , being nearly a medium of all the seasons. The French make it somewhat higher, reckoning it equal to the cave of their royal observatory, or 53° . In cold countries, the air is found agreeable enough to the inhabitants while it is between 40 and 50° . In our climate we are best pleased with the heat of the air from 50 to 60° ; while in the hot countries the air is generally at a medium about 70° . With us, the air is not reckoned warm till it arrives at about 64° , and it is very warm and sultry at 80° . It is to be noted, that the foregoing observations are to be understood of the state of the air in the shade; for as to the heat of bodies acted upon by the direct rays of the sun, it is much greater: thus, Dr. Martine found dry earth heated to above 120° ; but Dr. Hales found a very hot sun shine heat in 1727 to be about 140° ; and Musschenbroek once observed it so high as 150° ; but at Montpellier the sun was so very hot, on one day in the year 1705, as to raise M. Amontons's thermometer to the mark of boiling water itself, which is our 212° .

It appears from the register of the thermometer kept at London by Dr. Heberden for 9 years, viz. from the end of 1763 to the end of 1772, that the mean heat at 8 in the morning was $47^{\circ} 4$; and by another register kept at Hawkhill, near Edinburgh, that the mean heat in that place, during the same period of time, was 46° . Also by registers kept in London and at Hawkhill, for the three years 1772, 1773, 1774, it appears that the mean heat of these three years in London, at 8 in the morning, was $48^{\circ} 5$, and at 2 in the afternoon 56° , but the mean of both morning and afternoon $52^{\circ} 2$; while the mean heat at Hawkhill for the same time,

at 8 in the morning, was	$45^{\circ} 4$
and at 2 in the afternoon	$50^{\circ} 1$
and the mean of both	$47^{\circ} 7$

The mean heat of springs near Edinburgh seems to be 47° , and at London 51° . *Philos. Transf.* vol. 65, art. 44.

Lastly, from the meteorological journals of the Royal Society, published in the *Philos. Transf.* it appears that the mean heights of the thermometer, for the whole years, kept without and within the house, are as below:

	Therm. Without	Therm. Within
For 1775	$51^{\circ} 5$	$52^{\circ} 7$
1776	$51^{\circ} 1$	$52^{\circ} 9$
1777	$51^{\circ} 0$	$53^{\circ} 0$
1778	$52^{\circ} 0$	$53^{\circ} 1$
mean of all	$51^{\circ} 4$	$52^{\circ} 9$

HEATH, in botany. See ERICA.

Berry-bearing HEATH. See EMPETRUM.

HEATH (James), an English historian, was born 1629 at London; where his father, who was the king's cutler, lived. He was educated at Westminster-school, and became a student of Christ-church, Oxford, in 1646. In 1648 he was ejected from thence by the parliament visitors for his adherence to the royal cause; lived upon his patrimony till it was almost spent; and then marrying, was obliged to write books and correct the press in order to maintain his family. He died of a consumption and dropsy at London in August 1664, and left several children to the parish. His principal publications were, 1. A brief Chronicle of the late intestine War in the Three Kingdoms of England, Scotland, and Ireland, &c. 1661, 8vo; afterwards enlarged by the author, and completed from 1637 to 1663, in four parts, 1663, in a thick 8vo. To this was again added a continuation from 1663 to 1675 by John Philips, nephew by the mother to Milton, 1676, folio. 2. Flagellum: or, the Life and Death, Birth and Burial, of Oliver Cromwell, the late Usurper, 1663. The third edition came out with additions in

1665, 8vo. 3. A New Book of Loyal English Martyrs and Confessors, who have endured the Pains and Terrors of Death, Arraignment, &c. for the Maintenance of the just and legal Government of these Kingdoms both in Church and State, 1663, 12mo. The reason why such writers as our author continue to be read, and will probably always be read, is not only because *Historia quoquo modo scripta deletat*; but also because in the meanest historian there will always be found some facts, of which there will be no cause to doubt the truth, and which yet will not be found in the best. Thus Heath, who perhaps had nothing but pamphlets and newspapers to compile from, frequently relates facts that throw light upon the history of those times, which Clarendon, though he drew every thing from the most authentic records, has omitted.

HEATH (Thomas), an alderman of Exeter, and father of John Heath, Esq; one of the Judges of the Common Pleas, was author of An Essay towards a new English Version of the book of Job from the original Hebrew, with some account of his Life, 1755, 8vo. His brother Benjamin, a lawyer of eminence, and town clerk of Exeter, was likewise an author; and wrote, 1. An Essay towards a demonstrative Proof of the Divine Existence, Unity, and Attributes; to which is premised, A short Defence of the Argument commonly called *a priori*, 1740. 2. The Case of the County of Devon with respect to the Consequences of the New Excise Duty on Cyder and Perry. Published by the direction of the Committee appointed at a General Meeting of that County to superintend the Application for the Repeal of that Duty, 1763, 4to. 3. *Notæ sive Lectiones ad Tragicorum Græcorum veterum, Æschyli, &c.* 1752, 4to; a work which places the author's learning and critical skill in a very conspicuous light. The same solidity of judgment apparent in the preceding, distinguished the author's last production. 4. A Revival of Shakespeare's Text, wherein the alterations introduced into it by the more modern editors and critics are particularly considered, 1765, 8vo.

HEATHENS, in matters of religion. See PAGANS.

HEAVEN, an azure transparent orb investing our earth, where the celestial bodies perform their motions. It is of various denominations, as the highest or empyrean Heaven, the ethereal or starry Heaven, the planetary Heaven, &c. Formerly the Heavens were considered as solid substances, or else as spaces full of solid matter; but Newton has abundantly shown that the Heavens are void of almost all resistance, and consequently of almost all matter: this he proves from the phenomena of the celestial bodies; from the planets persisting in their motions, without any sensible diminution of their velocity; and the comets freely passing in all directions towards all parts of the Heavens. Heaven, taken in this general sense, or the whole expanse between our earth and the remotest regions of the fixed stars, may be divided into two very unequal parts, according to the matter occupying them; viz. the atmosphere or aerial Heaven, possessed by air; and the ethereal Heaven, possessed by a thin and unresisting medium, called ether.

HEAVEN is more particularly used, in Astronomy, for an orb, or circular region, of the ethereal Heaven. The ancient astronomers assumed as many different Heavens as they observed different celestial motions. All these they made solid, thinking they could not otherwise sustain the bodies fixed in them; and of a spherical form, as being the most proper for motion. Thus they had seven Heavens for the seven planets; viz. the Heavens of the Moon, Mercury, Venus, the Sun, Mars, Jupiter, and Saturn. The 8th was for the fixed stars, which they particularly called the firmament. Ptolemy added a 9th Heaven, which he called the primum mobile. After him two crystalline Heavens were added by king Alphonsus, &c. to account for some irregularities in the motions of the other Heavens. And lastly an empyrean Heaven was drawn over the whole for the residence

of the Deity; which made the number 12. But others admitted many other Heavens, according as their different views and hypotheses required. Eudoxus supposed 23, Calippus 30, Reiomontanus 33, Aristotle 47, and Fracastor no less than 70. The astronomers however did not much concern themselves whether the Heavens they thus allowed, were real or not; provided they served a purpose in accounting for any of the celestial motions, and agreed with the phenomena.

HEBDOMADARY, HEBDOMADARIUS, or HEBDOMADIUS, a member of a chapter or convent, whose week it is to officiate in the choir, to rehearse the anthems and prayers, and to perform the usual functions which the superiors perform at solemn feasts, and on other extraordinary occasions. The word is formed of the Greek *ἑβδομας*, which signifies the number seven; of *ἐκκλησία*, seven. The hebdomadary generally collates to the benefices which become vacant during his week; though it is usually looked upon as an abuse. In cathedrals, the hebdomadary was a canon or prebendary, who had the peculiar care of the choir, and the inspection of the officers for his week. In monasteries, the hebdomadary is he who waits at table for a week, or other stated period; directs and assists the cook, &c.

HEBDOME, a solemnity of the ancient Greeks, in honour of Apollo, in which the Athenians sung hymns to his praise, and carried in their hands branches of laurel. The word signifies the *seventh day*, this solemnity being observed on the seventh day of every lunar month.

HEBE, in ancient mythology, a goddess, the idea of whom, among the Romans, seems to have been much the same with that of eternal youth, or an immortality of bliss; agreeably to which, she is represented, on a gem in the great duke's collection at Florence, with a young airy look, and drinking out of a little bowl; or, according to Milton's expression, "Quaffing immortality and joy." She is fabled to have been a daughter of Jupiter and Juno. According to some she was the daughter of Juno only, who conceived her after eating lettuces. As she was fair and always in the bloom of youth, she was called the goddess of youth, and made by her mother cup-bearer to all the gods. She was dismissed from her office by Jupiter, because she fell down in an indecent posture as she was pouring nectar to the gods at a grand festival; and Ganymedes, the favourite of Jupiter, succeeded her as cup-bearer. She was employed by her mother to prepare her chariot, and to harness her peacocks whenever requisite. When Hercules was raised to the rank of a god, he was reconciled to Juno by marrying her daughter Hebe, by whom he had two sons, Alexiares and Anicetus. As Hebe had the power of restoring gods and men to the vigour of youth, she, at the instance of her husband, performed that kind office to Iolaus his friend. Hebe was worshipped at Sicyon under the name of Dia, and at Rome under that of Juventas.

HEBENSTREITIA, in botany; a genus of the angiosperma order, belonging to the didynamia class of plants; and in the natural method ranking under the 48th order, *aggregata*. The calyx is emarginated, and divided below; the corolla unilabiate; the lip rising upwards, and quadrid; the capsule dispersing; the stamens inserted into the margin of the limb of the corolla.

HEBER, the son of Salah, and father of Peleg, from whom the Hebrews derived their name, according to Josephus, Eusebius, Jerome, Bede, and most of the interpreters of the sacred writings; but Huet bishop of Avranches, in his Evangelical Demonstration, has attempted to prove, that the Hebrews took their name from the word *heber*, which signifies *beyond*, because they came from beyond the Euphrates. Heber is supposed to have been born 2281 years B. C. and to have lived 464 years.

HEBRAISM, an idiom, or manner of speaking, peculiar to the Hebrew language. See the next article.

HEBREW, something relating to the Hebrew. See HEBREWS. Thus we say, HEBREW Bible. See BIBLE.

HEBREW Character. There are two kinds of Hebrew characters: the ancient, called also the *square*; and the modern, or rabbinical characters.

1. The square Hebrew takes its denomination from the figure of its characters, which stand more square, and have their angles more exact and precise than the other. This character is used in the text of holy scripture, and their other principal and most important writings. When both this and the rabbinical character are used in the same work, the former is for the text, or the fundamental part; and the latter for the accessory part, as the glosses, notes, commentaries, &c. The best and most beautiful characters of this kind, are those copied from the characters in the Spanish manuscripts; next, those from the Italian manuscripts; then those from the French; and lastly, those of the Germans, whose characters are much the same, with respect to the other genuine square Hebrew characters, that the Gothic or Dutch characters are with respect to the Roman.

Several authors contend, that the square character is not the real ancient Hebrew character, written from the beginning of the language to the time of the Babylonish captivity; but that it is the Assyrian, or Chaldee character, which the Jews assumed, and accustomed themselves to, during the captivity, and retained afterwards. They say, that the Jews, during their captivity, had quite disused their ancient character; so that Ezra found it necessary to have the sacred books transcribed into the Chaldean square character. These authors add, that what we call the Samaritan character, is the genuine ancient Hebrew. Of this opinion are Scaliger, Bochart, Casaubon, Vossius, Grotius, Walton, Capellus, &c. and among the ancients Jerome and Eusebius. On this side it is urged, that the present characters are called Assyrian by the ancient Jewish writers of the Talmud, and therefore must have been brought from Assyria; but to this argument it is replied, that there were two sorts of characters anciently in use, viz. the sacred or present square character, and the profane or civil, which we call Samaritan; and that the sacred is called Assyrian, because it first began in Assyria to come into common use. It is farther alleged, that the Chaldee letters, which the Jews now use, were unknown to the ancient Jews before the captivity, from Dan. i. 4. Moreover, it is inferred from 2 Kings, xvii. 28, whence we learn that a Jewish priest was sent to teach the Samaritans the worship of Jehovah; on which occasion he must have taught them the law; and yet no mention occurs of his teaching them the language or character that the law was then written in, the character which the Samaritans used. But the chief argument is taken from some ancient Jewish shekels, with a legend on one side "The shekel of Israel," and on the other "Jerusalem the holy," both in Samaritan characters. These shekels, it is said, must have been coined before the division of the two kingdoms of Judah and Israel, or at least before the Assyrian captivity, because the Samaritans never afterwards reckoned Jerusalem holy. On the other side, or for the primitive antiquity of the square character, are the two Buxtorfs, Leusden, Calovius, Hottinger, Spanheim, Lightfoot, &c. They urge, from Matthew v. 18. that *jod* is really the least of the consonants in the present Hebrew, whereas it is one of the largest characters in the Samaritan alphabet: but Walton replies, that if our Saviour here speaks of the least letter of the alphabet, we can only infer, that the Chaldee character was used in our Saviour's time, which is not denied by those who maintain the Samaritan to be the original. They also allege, that the Jews were too obstinate and superstitious to allow their sacred character to be altered; but if this was done under the direction and authority of Ezra, the argument will be much invalidated. Farther, they say that Ezra

could not alter the ancient character, because it was impossible to make the alterations in all their copies. This argument, however, is contradicted by fact; since the old English black letter is actually changed for the Roman. They say, likewise, that Ezra was not disposed to profane the sacred writings with a heathen character: but this supposes that Ezra was so superstitious as to imagine, that there was some peculiar sanctity in the shape of the letters. Moreover, the advocates for this opinion appeal to ancient coins found in Judæa, with a legend in the Chaldee or Assyrian character. But the genuineness of these coins is much suspected.

The learned Jesuit Souciet maintains, with great address, that the ancient Hebrew character is that found on the medals of Simon, and others, commonly called *Samaritan medals*; but which, he asserts, were really Hebrew medals, struck by the Jews, and not the Samaritans.

Buxtorf endeavours to reconcile these two opinions, by producing a variety of passages from the rabbies to prove that both these characters were anciently used; the present square character being that in which the tables of the law, and the copy deposited in the ark, were written; and the other character being used in the copies of the law which were written for private and common use, and in civil affairs in general; and that after the captivity, Ezra enjoined the former to be used by the Jews on all occasions, leaving the latter to the Samaritans and apostates. But it can hardly be allowed by any who consider the difference between the Chaldee and Samaritan characters, with respect to convenience and beauty, that they were ever used at the same time. After all, it is of no great moment which of these, or whether either of them, were the original characters; since it appears, that no change of the words has arisen from the manner of writing them, because the Samaritan and Jewish Pentateuch almost always agree after so many ages. It is most probable that the form of these characters has varied in different periods; this appears from the testimony of Montfaucon, in his *Hexapla Origenis*, vol. i. p. 22. &c. and is implied in Dr. Kennicot's making the characters in which manuscripts are written one test of their age.

2. The modern, or rabbinical, is a good neat character, formed of the square Hebrew, by rounding it, and retrenching most of the angles or corners of the letters, to make it the more easy and flowing. The letters used by the Germans are very different from the rabbinical character used every where else, though all formed alike from the square character, but the German in a more slovenly manner than the rest. The rabbins frequently make use either of their own, or the square Hebrew character, to write the modern languages in. There are even books in the vulgar tongues printed in Hebrew characters; instances whereof are seen in the late French king's library.

HEBREW Language, that spoken by the Hebrews, and wherein the Old Testament is written. This appears to be the most ancient of all the languages in the world, at least we know of none older; and some learned men are of opinion, that this is the language in which God spoke to Adam in Paradise. Dr. Sharpe adopts the opinion that the Hebrew was the original language; not indeed that the Hebrew is the unvaried language of our first parents, but that it was the general language of men at the dispersion; and however it might have been improved and altered from the first speech of our first parents, it was the original of all the languages, or almost all the languages, or rather dialects, that have since arisen in the world.

The books of the Old Testament are the only pieces to be found, in all antiquity, written in pure Hebrew; and the language of many of these is extremely sublime: it appears perfectly regular, and particularly so in its conjugations. Indeed, properly speaking, it has but one conjugation; but this is varied in each seven or eight different ways, which has the effect

of so many different conjugations, and affords a great variety of expressions to represent by a single word the different modifications of a verb, and many ideas which in the modern and in many of the ancient and learned languages cannot be expressed without a periphrasis.

The primitive words, which are called *roots*, have seldom more than three letters or two syllables.

In this language there are 22 letters, only five of which are usually reckoned vowels, which are the same with ours, viz. *a, e, i, o, u*; but then each vowel is divided into two, a long and a short, the sound of the former being somewhat grave and long, and that of the latter short and acute: it must however be remarked, that the two last vowels have sounds that differ in other respects besides quantity and a greater or less elevation. To these 10 or 12 vowels may be added others, called *semi-vowels*, which serve to connect the consonants, and to make the easier transitions from one to another. The number of accents in this language are indeed prodigious: of these there are near 40, the use of some of which, notwithstanding all the inquiries of the learned, are not yet perfectly known. We know, in general, that they serve to distinguish the sentences like the points called *commas, semicolons, &c.* in our language; to determine the quantity of the syllables; and to mark the tone with which they are to be spoken or sung. It is no wonder, then, that there are more accents in the Hebrew than in other languages, since they perform the office of three different things, which in other languages are called by different names.

As we have no Hebrew but what is contained in the Scripture, that language to us wants a great many words; not only because in those primitive times the languages were not so copious as at present; but also on this account, that the inspired writers had no occasion to mention many of the terms that might be in the language.

The Chaldee, Syriac, Ethiopic, &c. languages, are by some held to be only dialects of the Hebrew; as the French, Italian, Spanish, &c. are dialects of the Latin. It has been supposed by many very learned men, that the Hebrew characters or letters were often used hieroglyphically, and that each had its several distinct sense understood as a hieroglyphic. Neumann, who seems to have taken infinite pains to find out this secret meaning of these letters, gives the following explication: *א aleph*, he says, is a character denoting motion, readiness, and activity; *ב beth*, signifies, 1. Matter, body, substance, thing; 2. Place, space, or capacity; and, 3. In, within, or contained: *ג gimel*, stands for flexion, bending, or obliquity of any kind: *ד dalet*, signifies any protrusion made from without, or any promotion of any kind: *ה he*, stands for presence, or demonstrative essence of any thing: *ו vau*, stands for copulation or growing together of things: *ז zain*, expresses vehement protrusion and violent compression, such as is occasioned by at once violently discharging and constringing a thing together; it also signifies sometimes the straitening of any figure into a narrow point at the end: *ח cheth*, expresses association, society, or any kind of composition or combination of things together: *ט tet*, stands for the withdrawing, drawing back, or recess of any thing: *י yod*, signifies extension and length, whether in matter or in time: *כ cap*, expresses a turning, curvedness, or concavity: *ל lamech*, stands for an addition, access, impulse, or adversation, and sometimes for pressure: *מ mem*, expresses amplitude, or the amplifying any thing in whatever sense; in regard to continuous qualities, it signifies the adding length, breadth, and circumference; and in disjunct qualities it signifies multitude: *נ nun*, signifies the propagation of one thing from another, or of the same thing from one person to another: *ס samech*, expresses circumscription and coarctation: *ע ain*, stands for observation, objection, or obviation: *פ pe*, stands for a crookedness or an

angle of any figure: *צ tsade*, expresses contiguity and close succession: *ק koph*, expresses a circuit or ambit: *ר resh*, expresses the egress of any thing, as also the exterior part of a thing, and the extremity or end of any thing: *ש shin*, signifies the number three, or the third degree, or the utmost perfection of any thing: *ת tau*, expresses a sequel, continuation, or succession of any thing.

According to this explication, as the several particular letters of the Hebrew alphabet separately signify the ideas of motion, matter, space, and several modifications of matter, space, and motion, it follows, that a language, the words of which are composed of such expressive characters, must necessarily be of all languages the most perfect and expressive; as the words formed of such letters, according to their determinate separate significations, must convey the idea of all the matters contained in the sense of the several characters, and be at once a name and a definition, or succinct description of the subject; and all things material as well as spiritual, all objects in the natural and moral world, must be known as soon as their names are known, and their separate letters considered.

The words *urim* and *thummim* are thus easily explained, and found, perhaps, the most apposite and expressive words that were ever formed.

Rabbinical, or *modern* HEBREW, is the language used by the rabbins in the writings they have composed. The basis or body hereof is the Hebrew and Chaldee, with divers alterations in the words of these two languages, the meanings whereof they have considerably enlarged and extended. Abundance of things they have borrowed from the Arabic; the rest is chiefly composed of words and expressions, chiefly from the Greek; some from the Latin; and others from the other modern tongues, particularly that spoken in the place where each rabbin lived or wrote.

The rabbinical Hebrew must be allowed to be a very copious language. M. Simon, in his *Hist. Crit. du Vieux Testam.* liv. iii. chap. 27. observes, that there is scarce any art or science that the rabbins have not treated of in it. They have translated most of the ancient philosophers, mathematicians, astronomers, and physicians; and have written themselves on most subjects: they do not want even orators and poets. Add, that this language, notwithstanding it is so crowded with foreign words, has its beauties visible enough in the works of those who have written well in it.

HEBREWS, the descendants of Heber, commonly called *Jews*. See *HEBER* and *Jews*.

HEBREWS, or *Epistle to the Hebrews*, a canonical book of the New Testament. Though St. Paul did not prefix his name to this epistle, the concurrent testimony of the best authors ancient and modern affords such evidence of his being the author of it, that the objections to the contrary are of little or no weight. The Hebrews, to whom this epistle was written, were the believing Jews of Palestine; and its design was to convince them, and by their means all the Jewish converts wheresoever dispersed, of the insufficiency and abolishment of the ceremonial and ritual law.

HEBRIDES, or *WESTERN ISLANDS*, a large cluster of islands on the W. coast of Scotland, the principal of which are Skye, St. Kilda, Lewis and Harris, N. and S. Uist, Cannay, Staffa, Mull, Jura, Ithly, &c. which see.

HEBRIDES, *NEW*, a group of islands first discovered by Quiros in 1606, and considered as part of a great southern continent, under the name of *Tierra Australia del Espíritu Santo*. They were next visited by M. de Bougainville in 1768, who did no more than discover that the land was not connected, but composed of islands, which he called the *Great Cyclades*. Captain Cook, in 1774, ascertained the extent and situation of the whole group, and gave them the name they now bear. They are situ-

ated between the latitudes of 14. 29. and 20. 4. S. and between the longitudes of 166. 41. and 170. 21. E. extending 125 leagues. The principal islands are Tierra del Espíritu Santo and Malicollo, beside several of less note, some of which are from 18. to 25 leagues in circuit. In general, they are high and mountainous, abounding with wood, water, and the usual productions of the tropical islands. The inhabitants are of very different appearances at different islands. They are, in general, of a slender make and dark colour, and most of them have frizzled hair. Their canoes and houses are small, and poorly constructed; and, except their arms, they have scarcely any manufacture, not even for clothing. They are, however, hospitable and good-natured, when not prompted to a contrary conduct by the jealousy which the unusual appearance of European visitors may naturally be supposed to excite.

HEBRUS, in ancient geography, the largest river of Thrace, rising from mount Scombrus; running in two channels till it comes to Philippopolis, where they unite. It empties itself at two mouths into the Ægean Sea, to the north of Samothrace. It was supposed to roll its waters upon golden sands. The head of Orpheus was thrown into it after it had been cut off by the Ciconian women.

HECATE, in fabulous history, a daughter of Perseus and Asteria, the same as Proserpine or Diana. She was called Luna in heaven, Diana on earth, and Hecate or Proserpine in hell; whence her name of *Diva triformis, tergemina, triceps*. She was supposed to preside over magic and enchantments. She was generally represented like a woman, with the head of a horse, a dog, or a boar; and sometimes she appeared with three different bodies, and three different faces, with one neck. Dogs, lambs, and honey, were generally offered to her, especially in ways and cross roads; whence she obtained the name of *Trivia*. Her power was extended over heaven, the earth, sea, and hell; and to her kings and nations supposed themselves indebted for their prosperity.

HECATESIA, a yearly festival observed by the Stratoniceans in honour of Hecate. The Athenians paid also particular worship to this goddess, who was deemed the patroness of families and of children. From this circumstance the statues of the goddesses were erected before the doors of the houses; and upon every new moon a public supper was always provided at the expense of the richest people, and set in the streets, where the poorest of the citizens were permitted to retire and feast upon it, while they reported that Hecate had devoured it. There were also expiatory offerings, to supplicate the goddesses to remove whatever evils might seem to threaten the public, &c.

HECATOMB, in antiquity, a sacrifice of an hundred beasts of the same kind, at an hundred altars, and by an hundred priests or sacrificers. The word is formed of the Greek *κατὰ*, which properly signifies a sumptuous or magnificent sacrifice. Others derive it from the Greek *κατὰ* *centum*, "a hundred," and *βας* *bos*, "bullock," &c.; on which footing the hecatomb should be a sacrifice of 100 bullocks. Others derive the word from *κατὰ* and *πες* *pes* "foot;" and on that principle hold, that the hecatomb might consist of only 25 four-footed beasts. They add, that it did not matter what kind of beasts were chose for victims, provided the quota of feet were but had. Pythagoras is said to have sacrificed a hecatomb to the muses, of 100 oxen, in joy and gratitude for his discovering the demonstration of the 47th proposition of the first book of Euclid, viz. that in a rectangled triangle the square of the hypotenuse is equal to the squares of the two other sides. For the origin of hecatombs: Strabo relates, that there were 100 cities in Laconia, and that each city used to sacrifice a bullock every year for the common safety of the country; whence the institution of the celebrated sacrifice of 100 victims, called *hecatombs*. Others refer the origin of hecatombs to a plague, wherewith the 100 cities of Peloponnesus

were afflicted; for the removal whereof, they jointly contributed to so splendid a sacrifice. Julius Capitolinus relates, that for a hecatomb they erected 100 altars of turf, and on these sacrificed 100 sheep and 100 hogs. He adds, that when the emperors offered sacrifices of this kind, they sacrificed 100 lions, 100 eagles, and 100 other beasts of the like kind.

HECATOMBÆON was the first month of the Athenian year, consisting of 30 days; beginning on the first new moon after the summer solstice, and consequently answering to the latter part of our June and the beginning of July. It had its name from the great number of hecatombs sacrificed in it. See *HECATOMBE*.

HECATOMPOLIS, a surname of the island of Crete, from its 100 cities. The territory of Laconia also had anciently this name for the same reason; and the custom of these 100 cities was to sacrifice a hecatomb annually.

HECATOMPYLOS, the metropolis of Parthia, and royal residence of Arsaces, situated at the springs of the Araxes. Thebes in Egypt had also the same name, from its 100 gates.

HECK, an engine to take fish. A salmon heck is a grate for catching that sort of fish.

HECKLE, among hemp-dressers. See *HATCHEL*.

HECLA, a volcano of Iceland, and one of the most furious in the world, situated on the southern part of the island. See *ICELAND*. It was visited in the year 1772 by Dr. Van Troil, a Swedish gentleman, along with Sir Joseph Banks, Dr. Solander, and Dr. James Lind of Edinburgh. On their first landing they found a tract of land 60 or 70 miles in extent entirely ruined by lava, which appeared to have been in the highest state of liquefaction. Having undertaken a journey to the top of the mountain, they travelled 300 or 360 English miles over an uninterrupted tract of lava; and had at length the pleasure of being the first who had arrived at the summit of the mountain.

Hecla, according to the accounts of these gentlemen, is situated in the southern part of the island, about four miles from the sea-coast, and is divided into three parts at the top, the middle point being the highest; and, according to an exact observation with Ramsden's barometer, is 5000 feet above the level of the sea. They were obliged to quit their horses at the first opening from which the fire had burst. They describe this as a place with lofty glazed walls and high glazed cliffs, unlike any thing which they had ever seen before.

A little higher up they found a large quantity of grit and stones; and still farther on, another opening, which, though not deep, descended lower than that of the highest point. Here they imagined they plainly discerned the effects of boiling water; and not far from thence the mountain began to be covered with snow, excepting some spots which were bare. The reason of this difference they soon perceived to be the hot vapour ascending from the mountain. As they ascended higher they found these spots become larger; and about 200 yards below the summit, a hole about a yard and an half in diameter was observed, from whence issued so hot a steam, that they could not measure the degree of heat with the thermometer. The cold now began to be very intense; Fahrenheit's thermometer, which, at the foot of the mountain was at 54, now fell to 24; the wind also became so violent, that they were sometimes obliged to lie down for fear of being blown down the most dreadful precipices. On the very summit they experienced at the same time a high degree of heat and cold; for, in the air, Fahrenheit's thermometer stood constantly at 24, but when set on the ground, rose to 153; the barometer stood at 22.247. Though they were very much inclined to remain here for some time, it could by no means be done with safety; for which reason they were obliged to descend very quickly.

The mountain seems to be made up, not of lava, but of sand, grit, and ashes; which are thrown up with the stones partly

discoloured, and partly melted by the fire. Several sorts of pumice stones were found on it, among which was one with some sulphur. Sometimes the pumice was so much burnt, that it was as light as tow. Its form and colour were sometimes very fine, but at the same time so soft, that it was difficult to remove it from one place to another. The common lava was found both in large pieces and small bits; as likewise a quantity of black jasper burned at the extremities, and resembling trees and branches. Some slate of a strong red colour was observed among the stones thrown out by the volcano. In one place the lava had taken the form of chimney-stacks half broken down. As they descended the mountain they observed three openings. In one, every thing looked as red as brick; from another, the lava had flowed in a stream about 50 yards broad, and after proceeding for some way, had divided into three large branches. Further on they perceived an opening, at the bottom of which was a mountain in form of a sugar loaf, in throwing up of which the fire appeared to have exhausted itself.

We have already observed, that our travellers were the first who ascended to the top of this mountain. The reason that no one before them had ever done so was partly founded in superstition, and partly the steepness and difficulty of the ascent, which was greatly facilitated by an eruption in 1766. Most kinds of lava found in other volcanic countries are to be met with about Hecla, or other Iceland volcanoes; as the grey, dark perforated kind, similar to the Derbyshire loadstone; the Iceland agate, pumex vitreus both the *niger* and *viridis*. Some have conjectured this to be the lapis obsidianus of the ancients, which they formed into statues.

The lava is seldom found near the openings whence the eruptions proceed, but rather loose grit and allies; and indeed the greater part of the Icelandic mountains consist of this matter; which, when it is grown cold, generally takes an arched form. The upper crust frequently grows hard and solid, whilst the melted matter beneath it continues liquid. This forms great cavities, whose walls, bed, and roof, are of lava, and where great quantities of stalactite lava are found. There are a vast number of these caves in the island, some of which are very large, and are made use of by the inhabitants for sheltering their cattle. The largest in the island is 5034 feet long, and from 50 to 54 in breadth, and between 34 and 36 in height. There are some prodigious clefts left by the eruptions, the largest of which is called *Almeneggaa*, near the water of Tingalla, in the south-western part of the island. It is 105 feet broad and very long. The direction of the chasm itself is from north to south. Its western wall, from which the other has been perpendicularly divided, is 107 feet six inches in height, and consists of many strata, of about 10 inches each in height, of lava grown cold at different times. The eastern wall is only 45 feet four inches in height, and that part of it which is directly opposite to the highest part of the other side is no more than 36 feet five inches high.

HECTIC FEVER. See MEDICINE.

HECTOR, the son of Priam and Hecuba, and the father of Astyanax, is celebrated for the valour with which he defended the city of Troy against the Greeks. He was killed by Achilles, who dragged his body, fastened to his chariot, thrice round the walls of Troy, and afterwards restored it to Priam for a large ransom. See TROY.

HEDERA, IVY, in botany; a genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method giving name to the 46th order, *Hederaceæ*. There are five oblong petals; the berry is pentaspermous, girt by the calyx. The species are, 1. The *helix*, or common ivy, grows naturally in many parts of Britain; and, where it meets with any support, will rise to a great height, sending out roots on every side, which strike into the joints of walls or the bark of

trees. If there is no support, they trail on the ground, and take root all their length, so that they closely cover the surface, and are difficult to eradicate. While these stalks are fixed to any support, or trail upon the ground, they are slender and flexible; but when they have reached to the top of their support, they shorten and become woody, forming themselves into large bushy heads, and their leaves are larger, more of an oval shape, and not divided into lobes like the lower leaves, so that it hath a quite different appearance. There are two varieties of this species, one with silver-striped leaves, the other with yellowish leaves on the tops of the branches; and these are sometimes admitted into gardens. 2. The *quinquefolia*, or Virginia creeper, is a native of all the northern parts of America. It was first brought to Europe from Canada; and has been long cultivated in the British gardens, chiefly to plant against walls or buildings to cover them: which these plants will do in a short time; for they will shoot almost 20 feet in one year, and will mount up to the top of the highest building: but as the leaves fall off in autumn, the plants make but an indifferent appearance in winter, and therefore are proper only for such situations as will not admit of better plants; for this will thrive in the midst of cities, and is not injured by smoke or the closeness of the air.

The first species is easily propagated by its trailing branches, and will thrive in almost any soil or situation. The second may be propagated by cuttings; which if planted in autumn in a shady border will take root, and by the following autumn will be fit to plant in those places where they are designed to remain.

The roots of the ivy are used by leather-cutters to whet their knives upon. Apricots and peaches covered with ivy during the month of February, have been observed to bear fruit plentifully. The leaves have a nauseous taste; Haller says, they are given to children in Germany as a specific for the atrophy. The common people of England apply them to issues; and an ointment made from them is in great esteem among the Highlanders of Scotland as a ready cure for burns. The berries have a little acidity. In warm climates, a resinous juice exudes from the stalks, which is said to be a powerful resolvent, and an excellent ingredient in plasters and ointments. Horses and sheep eat the plant; goats and cows refuse it. Caspar Bauhine and Tournefort mention a sort of ivy that grows in many of the islands of the Archipelago, to which they have given the name of the *poet's ivy*, because the ancients are said to have made crowns of this plant for adorning the brows of their poets. By others it is called *hedera dionysias*, because they made use of the same sort of ivy in their public rejoicings and feasts in honour of Bacchus. The berries are of a fine gold colour, whence this species has been termed by others *chrysocarpus*.

HEDERACEÆ, from *hedera* "ivy," the name of the 46th order in Linnæus's fragments of a natural method; consisting of ivy, and a few other genera, which from their general habit and appearance seem nearly allied to it. See BOTANY, p. 53.

HEDGE, in agriculture, a fence inclosing a field, garden, &c. made of branches of trees interwoven. The word is formed of the German *bag* or *baeg*, or the Anglo-Saxon *begge*, or *bege*, which signifies simply *inclosure*, *circumference*.

Quickset-HEDGES are so called from being made of quick or live trees, which have taken root, in contradistinction to those made of dead substances, as faggots, hurdles, dry boughs, &c. The hawthorn is esteemed the best of all the English shrubs for quickset hedges. The best method of raising this for use, is to put the haws into the ground as soon as ripe, and cover them with earth, and by the spring twelvemonth the young shoots will be of a due size to transplant from the seed-pot into hedge rows. The crab-tree is a common mixture with the hawthorn.

in hedges; but it grows faster than the hawthorn, and requires cutting to keep the hedge even. The young hawthorns raised from seed always thrive better than those picked up wild in the fields.

The great consideration in making quickset hedges is to bring the plants from a worse soil than that in which it is intended to set them. They must be about the thickness of a goose quill, well rooted and strong, and must be planted about four or five inches out of the ground. If there be a ditch to the hedge, it should be six feet wide at the top, one and a half at the bottom, and three feet deep. If the bank be without a ditch, the plants should be set in two rows, at a foot distance below one another. The turf is to be laid, with the grass-side downward, on that side of the ditch on which the bank is designed to be made, and some of the best mould must be laid upon it to bed the quick: then the quick is to be laid upon it a foot asunder, so that the end of it may be inclining upwards; and, at equal distances of thirty feet, plant an ash, oak, crab or elm, to grow with the quick. When the first row of quick is laid, it must be covered with mould, and the turf laid upon it as before, and some more mould upon that; so that, when the bank is a foot high, another row of sets may be laid against the spaces of the lower quick. These must be then covered as the former, and the bank is to be then topped with the bottom of the ditch, and a dry or dead hedge laid to shade the under plantation. There should then be stakes driven into the loose earth quite down to the firm ground, at about two feet and a half distance from each other; oak stakes are accounted the best of all for this use, and the next to this those of black thorn or sallow. Small bushes are to be laid below, but not too thick, only to cover the quick from being injured as it shoots.

The young plants must be constantly weeded, and great care must be taken to preserve them from being bitten by cattle, especially sheep. If they have been cropped, or are not found to grow well, it is a good custom among the farmers to cut them down in February to the ground, or within an inch of it, for after this they usually send out new roots, and shoot very vigorously.

When the hedge is of eight or nine years growth, it may be plashed or laid down, by giving the shoots or branches a cut with a knife or a bill half through, and then weaving them about the stakes, and trimming off the small superfluous branches. See FENCE. The crab, black-thorn or sloe, and holly, are sometimes planted for hedges.

Instead of building a garden wall facing the north-east, Mr. Lawrence advises, that to save charge, &c. a crab tree hedge of three rows be planted; which will be a good mound, and quickly grow up to be a better fence than a wall against the west and south-west winds, which make the greatest destruction in a garden, and which blow two parts in three of the whole year; besides the stock of fruit such a hedge, grafted with red-streak or gennet moyl, will yield.

Hedges for ornament in gardens, are sometimes planted with evergreens, in which case the *holly* is preferable to any other. Next to this most people prefer the *ycu*, on account of its growing very close; but the dead colour of its leaves renders these hedges less agreeable. The *laurel* is one of the most beautiful evergreens, but the shoots are so luxuriant, that it is difficult to keep it in any tolerable shape; but hedges that are formed of laurel, which has large leaves, should be pruned with a knife, cutting the shoots just down to a leaf; and this method is much better than that of cutting them with shears. The *laurustinus* is also a very fine plant for the purpose of ornamental hedges; but this is liable to the same objection as the laurel; it ought, therefore, to be pruned with a knife, in April, when the flowers are going off; but the new shoots of the same spring must by no means be shortened. The small-leaved and rough *laurustines*

are the best plants for this purpose. The true *phyllirea* is the next best plant for hedges, which may be led up to the height of ten or twelve feet; and if they are kept narrow at the top, that the snow may not have room to lodge upon them, they will become close and thick, and make a fine appearance. The *ilex*, or evergreen oak, is also planted for hedges, and is a fit plant for those that are designed to be very tall. The deciduous trees, which are usually planted to form hedges in gardens, are the hornbeam, which may be kept neat with less trouble than most other plants; the beech; and the small-leaved English elm, which should not be planted closer than seven or eight, or even ten feet: the lime tree has also been recommended for this purpose; but, as hedges thus formed become thin at bottom, and the leaves turn of a black disagreeable colour, it is now disused. The alder is frequently used for hedges; and where the soil is moist, it is preferable to any of the deciduous trees, because its leaves are of a lively green till late in autumn, and when they decay their litter is soon over. Many of the flowering shrubs have been planted for hedges, such as roses, honey-suckles, sweet-brier, &c. but these are difficult to train; and if they are cut to keep them within compass, their flowers, which are their greatest beauty, will be entirely destroyed. However, these hedges are by no means to be recommended for pleasure-gardens, either as ornamental or useful.

By 43 Eliz. cap. 7. hedge-breakers are bound to pay such damages as a justice of the peace shall think fit; and if not able to pay, they shall be committed to the constable to be whipped. And hedge-stealers may be apprehended, and the justice shall adjudge a penalty, not exceeding 10s. to the poor; or, in want of payment, they shall be sent to the house of correction for a month. 15 Car. II. cap. 2. And persons convicted of buying stolen wood, shall forfeit treble the value.

HEDGE-Hog. See ERINACEUS.

HEDGE-Sparrow. See MOTACILLA.

HEDYCARYA, in botany; a genus of the polyandria order, belonging to the diœcia class of plants. The calyx of the male is cleft in eight or ten parts; there is no corolla, nor are there any filaments; the antheræ are in the bottom of the calyx, four furrowed, and bearded at top. The calyx and corolla of the female are as in the male; the germs pedicellated; the nuts pedicellated and monospermous.

HEDYOTIS, in botany; a genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 47th order, *Stellatæ*. The corolla is monopetalous and funnel-shaped; the capsule is bilocular, polyspermous, inferior.

HEDYSARUM, in botany; a genus of the decandria order, belonging to the diadelphina class of plants; and in the natural method ranking under the 32d order, *Papilionacæ*. The carina of the corolla is transversely obtuse; the seed-vessel a legumen with monospermous joints. There are 59 species of this plant, of which the most remarkable are, 1. The *gyrans*, or sensitive hedyfarum, a native of the East Indies, where it is called *burrum chundalli*. It arrives at the height of four feet, and in autumn produces bunches of yellow flowers. The root is annual or biennial. It is a trifolious plant, and the lateral leaves are smaller than those at the end, and all day long they are in constant motion without any external impulse. They move up and down and circularly. This last motion is performed by the twisting of the footstalks; and while the one leaf is rising, its associate is generally descending. The motion downwards is quicker and more irregular than the motion upwards, which is steady and uniform. These motions are observable for the space of 24 hours in the leaves of a branch which is lopped off from the shrub if it is kept in water. If from any obstacle the motion is retarded, upon the removal of that obstacle it is resumed with a greater degree of velocity. 2. The

acronatium, or common biennial French honeysuckle, hath large deeply-striking biennial roots; upright, hollow, smooth, very branchy stalks, three or four feet high, garnished with pinnated leaves; and from between the leaves proceed long spikes of beautiful red flowers, succeeded by jointed seed-pods. The first species, being a native of hot climates, requires the common culture of tender exotics; the second is easily raised from seed in any of the common borders, and is very ornamental.

HEEL, in anatomy, the hind part of the foot. See ANATOMY, p. 158.

HEEL of a Horse, the lower hinder part of the foot comprehended between the quarters and opposite to the toe. The heel of a horse should be high and large, and one side of it should not rise higher than the other upon the pastern. It is of the utmost importance, by a judicious manner of shoeing, to keep the heels of a horse from contracting. See FARRIERY, Part IV.

HEEL of a Horseman. This being the part that is armed with the spur, the word is used for the spur itself: "This horse understands the heel well." To ride a horse from one heel to another, is to make him go sideways, sometimes to one heel and sometimes to the other.

HEEL, in the sea-language. If a ship leans on one side, whether she be aground or afloat, then it is said she heels a-starboard, or a-port; or that she heels offwards, or to the shore; that is, inclines more to one side than to another.

HEELER, or Bloody HEEL Cock, a fighting cock, that strikes or wounds much with his spurs. Cock-fighters know such a cock, even while a chicken, by the striking of his two heels together in his going.

HEEM (John David), an able painter, born at Utrecht in 1604. He excelled in painting flowers, fruit, vases, and instruments of music, which he performed in such a perfect manner, that a person was apt to attempt taking them in his hand. His colouring is agreeable, and the insects in his pictures appear alive. He died at Antwerp in 1674. Cornelius de HEEM, his son, was also a good painter, though inferior to his father.

HEGIRA, in chronology, a celebrated epoch among the Mahometans. The word is Arabic, formed of هجر, *bagirab*, flight; or هجر, *to fly, quit one's country, family, friends, &c.* The event which gave occasion to this epocha, was Mahomet's flight from Mecca. The magistrates of that city, fearing his impostures might raise a sedition, resolved to expel him: this, accordingly, they effected in the year of our Lord 622, on the evening of the 15th or 16th of July. To render this epocha more creditable, the Mahometans affect to use the word *begira* in a peculiar sense for an act of religion, whereby a man forsakes his country, and gives way to the violence of persecutors and enemies of the faith: they add, that the Corashites, being then the strongest party in the city, obliged their prophet to fly, as not being able to endure his abolishing of idolatry. This flight was not the first of Mahomet's, but it was the most famous. It happened in the 14th year from his assuming the character of prophet and apostle, and promulgating his new religion.

The orientals do not agree with us as to the time of the hegira. Among the Mahometans, Amasi fixes it to the year of Christ 630, and from the death of Moses 2347; and Ben Cassim to the year of the world 5800: according to the Greek computation, among the Christians, Said Ebn Batrik refers the hegira to the year of Christ 614, and of the creation 6114. Khoundemir relates, that it was Omar, the second caliph, that first established the hegira as an epocha, and appointed the years to be numbered from it: at the time he made this decree, there were already seven years elapsed. This establishment was made in imitation of the Christians, who, in those times, reckoned their years from the persecution of Dioclesian. But there is another hegira, and that earlier too, though of less eminence.

Mahomet, in the 14th year of his mission, was obliged to relinquish Medina: the Corashites had all along opposed him very vigorously, as an innovator and disturber of the public peace; and many of his disciples, not enduring to be reputed followers of an impostor, desired leave of him to abandon the city, for fear of being obliged to renounce their religion. This retreat makes the first hegira. These two hegiras the Mahometans, in their language, call *begiratan*.

The years of the hegira consist only of 354 days. To reduce these years to the Julian calendar, i. e. to find what Julian year a given year of the hegira answers to, reduce the year of the hegira given into days, by multiplying by 354, divide the product by 365, and from the quotient subtract the intercalations, i. e. as many days as there are four years in the quotient; and lastly, to the remainder add 622. See YEAR.

HEIDEGGER (John James), was the son of a clergyman, and a native of Zurich in Switzerland, where he married, but left his country in consequence of an intrigue. Having had an opportunity of visiting the principal cities of Europe, he acquired such a taste for elegant and refined pleasures, as peculiarly fitted him for the management of public amusements. In 1708, when he was near 50 years old, he came to England on a negotiation from the Swiss at Zurich; but, failing in his embassy, he entered as a private soldier in the guards for protection. By his sprightly conversation and insinuating address, he soon worked himself into the good graces of our young people of fashion; from whom he obtained the appellation of "the Swiss Count." He had the address to procure a subscription, with which, in 1709, he was enabled to furnish out the opera of "Thomyris," which was written in English, and performed at the queen's theatre in the Haymarket. The music, however, was Italian; that is to say, airs selected from sundry of the foreign operas by Bunoncini, Scarlatti, Steffani, Gasparini, and Albinoni. Heidegger by this performance alone was a gainer of 500 guineas. The judicious remarks he made on several defects in the conduct of our operas in general, and the hints he threw out for improving the entertainments of the royal theatre, soon established his character as a good critic. Appeals were made to his judgment; and some very magnificent and elegant decorations introduced upon the stage in consequence of his advice, gave such satisfaction to George II. who was fond of operas, that, upon being informed to whose genius he was indebted for these improvements, his majesty was pleased from that time to countenance him, and he soon obtained the chief management of the opera house in the Haymarket. He then set about improving another species of diversion, not less agreeable to the king, which was the masquerades, and over these he always presided at the king's theatre. He was likewise appointed master of the revels. The nobility now cared little for much, and had such an opinion of his taste, that all splendid and elegant entertainments given by them upon particular occasions, and all private assemblies by subscription, were submitted to his direction. From the emoluments of these several employments, he gained a regular considerable income, amounting, it is said, in some years, to 5000l. which he spent with much liberality; particularly in the maintenance of a somewhat too luxurious table; so that it may be said he raised an income, but never a fortune. At the same time his charities ought not to pass unnoticed, which were frequent and ample. After a successful masquerade, he has been known to give away several hundred pounds at a time. "You know poor objects of distress better than I do," he would frequently say to a particular acquaintance; "be so kind as to give away this money for me." This well known liberality, perhaps, contributed much to his carrying on that diversion with so little opposition as he met with. He died in 1749, at the advanced age of 50 years.

This extraordinary man was long the *Arbiter Elegantiarum* of England. He is alluded to in many publications of his time, and many ludicrous anecdotes have been related concerning him. Heidegger's countenance was peculiarly unpleasing, from an unusual harshness of features. There is a mezzotinto of him by J. Faber, 1742, from a painting by Vanloo, a striking likeness; and his face is introduced in more than one of Hogarth's prints. Heidegger was, however, the first to joke upon his own ugliness; and he once laid a wager with the earl of Chesterfield, that within a certain given time his lordship would not be able to produce so hideous a face in all London. After a strict search, a woman was found, whose features were at first sight thought stronger than Heidegger's; but upon clapping her head-dress upon himself, he was universally allowed to have won the wager. Jolly, a well-known taylor, carrying his bill to a noble duke; his grace, for evasion, said, "Damn your ugly face, I never will pay you till you bring me an uglier fellow than yourself!" Jolly bowed and retired, wrote a letter, and sent it by a servant to Heidegger; saying, "His grace wished to see him the next morning on particular business." Heidegger attended, and Jolly was there to meet him; and in consequence, as soon as Heidegger's visit was over, Jolly received the cash.

Being once at supper with a large company, when a question was debated, Which nationalist of Europe had the greatest ingenuity? to the surprise of all present, he claimed that character for the Swiss, and appealed to himself for the truth of it. "I was born a Swiss (said he), and came to England without a farthing, where I have found means to gain 5000l. a-year, and to spend it. Now I defy the most able Englishman to go to Switzerland, and either to gain that income or to spend it there." Heidegger is said to have had so remarkable a memory, that he once walked from Charing-cross to Temple-bar, and back again; and when he came home, wrote down every sign on each side of the street.

HEIDENHEIM, a town of Germany, in Suabia, and in the territory of Brentzthal, with a handsome palace, belonging to the house of Wirtemberg, 22 miles N. of Ulm. E. lon. 10. 9. N. lat. 48. 47.

HEIDELBERG, a considerable and populous town of Germany, capital of the Lower Palatinate, with a celebrated university. It is noted for its great tun, which holds 800 hog-heads, generally kept full of good Rhenish wine. It stands in a pleasant rich country, and was a famous seat of learning; but it has undergone so many calamities, that it is nothing now to what it was formerly. It was first reduced to a heap of ruins in 1622 by the Spaniards; and the rich library was transported, partly to Vienna, and partly to the Vatican at Rome. After this it enjoyed the benefits of peace, till the Protestant electoral house became extinct, and a bloody war ensued, in which the castle was ruined. This happened in 1693; and the people of the Palatinate were obliged to leave their dwellings, and to go for refuge into foreign countries. To add to these misfortunes, the elector resided at Mannheim, and carried most of the people of distinction with him. The great tun was broke to pieces in 1693 by the French, and, at a great expence, in 1729, was repaired. The town stands on the river Neckar, over which is a handsome bridge, 12 miles N. E. of Spire. E. lon. 8. 48. N. lat. 49. 26.

HEIGHT, in general, signifies the difference between the ground and the top of any object measured perpendicularly. For the *Methods of measuring HEIGHTS*, see GEOMETRY, TRIANGONOMETRY, BAROMETER, &c.

HEILA, a town of Western Prussia, seated at the mouth of the Vistula, on the Baltic Sea, 12 miles N. of Dantzick. E. lon. 19. 25. N. lat. 54. 53.

HEILEGEN-HAVE, a seaport of Germany, in Holstein,

seated on the Baltic, opposite the island of Femeren. E. lon. 10. 57. N. lat. 54. 30.

HEINECCIUS (John Gotlieb), one of the greatest civilians of the 18th century, was born at Eisenberg, in the principality of Altenburg, in 1681. After having studied at Gosslar and Leipsick, he was designed for the ministry, and began to preach; but disliking that profession, he laid it aside, and applied himself entirely to the study of philosophy and the civil law. In 1710 he became professor of philosophy at Hall; and in 1721 he was made professor of civil law, with the title of *counsellor of the court*. His great reputation made the States of Friesland invite him to Franeker in 1724; but three years after the king of Prussia prevailed on him to accept of a professorship of law at Francfort on the Oder, where he distinguished himself till the year 1733. Becoming again professor at Hall, he remained there till his death, which happened in 1741, notwithstanding his being invited to Marburg, Denmark, and three academies in Holland. He wrote many works, all of them much esteemed. The principal are, 1. *Antiquitatum Romanarum jurisprudentiam illustrantium syntagma*. It was this excellent abridgement that gave rise to his reputation in foreign countries. 2. *Elementa juris civilis secundum ordinem institutionum & pandectarum*. 3. *Fundamenta styli cultioris*. There are few works so useful as this for forming a Latin style. 4. *Elementa philosophiæ rationalis & moralis, quibus præmissa historia philosophica*. 5. *Historia juris civilis Romani ac Germanici*. 6. *Elementa juris naturæ & gentium, &c.*

HEINETKEN (Christian), an extraordinary child, the prodigy of the North, was born at Lubeck in 1721. He spoke his maternal tongue fluently at 10 months. At one year old, he knew the principal events of the pentateuch; in two months more he was master of the entire history of the Old and New Testaments; at two years and an half he answered the principal questions in geography and in ancient and modern history; and he spoke Latin and French with great facility before the commencement of his fourth year. His constitution was so delicate, that he was not weaned till a few months before his death. M. Martini of Lubeck published a pamphlet in 1730, in which he endeavoured to give natural reasons for the extraordinary capacity of this infant, who died in his fifth year.

HEINSIUS (Daniel), professor of politics and history at Leyden, and librarian to the university there, was born at Gand in Flanders in 1580. He became a scholar to Joseph Scaliger at Leyden, and was indebted to the encouragement and care of that great man for the perfection to which he attained in literature, and which at the beginning of his life there was little reason to hope from him. He distinguished himself as a critic by his remarks on many classical authors; and was highly honoured as well abroad as at home: Gustavus Adolphus king of Sweden gave him a place among his counsellors of state; the republic of Venice made him a knight of the order of St. Mark; and pope Urban VIII. made him great offers, if he would come, as he expressed it, "to rescue Rome from barbarism." He died in 1666, leaving several works of his own, both in poetry and prose.

HEINSIUS (Nicholas), the son of Daniel Heinsius, was born at Leyden; and became as great a Latin poet, and a greater critic, than his father. His poems have been several times printed, but the best edition is that of Amsterdam in 1666. He gave editions of several of the classics, with notes; his Claudian is dedicated in a Latin poem to queen Christina of Sweden, and his Ovid to Thuanus. At his death, which happened in 1681, he disclaimed all his works, and expressed the utmost regret at having left behind him so many "monuments of his vanity," as he called them. He was as much distinguished by his great employments in the state, as by his talents, learning, and good qualities.

HEIR, in law, signifies the person who succeeds another by

descent to lands, tenements, and hereditaments, being an estate of inheritance, or an estate in fee; because nothing passes by right of inheritance but in fee. See the articles *CONSANGUINITY*, *DESCENT*, *FREE*, *SUCCESSION*; and *LAW*. *HEIR-Apparent*, is a person so called in the lifetime of his ancestor, at whose death he is heir at law. *HEIR-Presumptive*, is one who, if the ancestor should die immediately, would, in the present circumstances of things, be his heir; but whose right of inheritance may be defeated by the contingency of some nearer heir being born.

HEIR Loom, formed of *heir* and the Saxon *loom*, denoting *limb* or *members*, in our law-books, signifies such goods and personal chattels as are not inventoried after the owner's decease, but necessarily come to the heir along with the house. *Heir-loom* comprehends various implements; as tables, presses, cupboards, bedsteads, furnaces, wainscot, and such like; which in some countries have belonged to a house for certain descents, and are never inventoried after the decease of the owner, as chattels are, but accrue by custom, not by common law, to the heir, with the house itself. The ancient jewels of the crown are held to be heir-looms, and are not deviseable by will, but descend to the next successor.

HEIRESS, a female heir to one who has an estate in lands, &c. See *HEIR*. The stealing an heiress is made highly penal by the laws of England. See *FORCIBLE Marriage*.

HEISTERIA, in botany; a genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 12th order, *Holoraceæ*. The calyx is quinquefid, the petals five; the fruit is a plum on a very large coloured calyx.

St. *HELENA*, an island in the Atlantic Ocean, belonging to the English East India Company. Its circumference is about 20 miles. It has some high mountains, particularly one called Diana's Peak, which is covered with woods to the very top. There are other hills also, which bear evident marks of a volcanic origin; and some have huge rocks of lava and a kind of half vitrified slags. The country, however, is far from being barren, the interior valleys and even mountains being pleasant and fertile. Mr. Forster, who made an excursion about half a mile into the country, informs us, that he was transported with one of the finest prospects he had ever seen, consisting of several little hills, covered with rich verdure, and interspersed with fertile valleys, which contained gardens, orchards, and various plantations. Many pastures, he adds, were surrounded by inclosures of stone, and filled with a small but fine breed of cattle, and with English sheep. Every valley was watered by a rivulet. The mountains, in the centre of the island, were hung with woods. The soil, which covered the rocks and mountains, was, in general, a rich mould, from six to ten inches deep, clothed with a variety of plants and shrubs, among which was a tree which the inhabitants call a cabbage-tree (though only used for fuel), gum trees, and red wood. In the governor's garden, three miles from the town, he saw several plants of Europe, Africa, and America, and particularly a profusion of roses and lilies, interspersed with myrtle and laurel. Several walks of peach-trees were loaded with fruit, which had a peculiar rich flavour, different from that of our peaches; but the other European fruit-trees throve but indifferently, and never bore fruit. Vines had been planted several times, but had not succeeded, on account of the climate. Cabbages and other greens thrive extremely well, but are devoured by caterpillars; and the barley, and other kinds of corn, are generally devoured by rats, which are inconceivably numerous. The ground, for that reason, was laid out chiefly in pastures, the verdure of which was surprising; and the island can support 3000 head of their small cattle. The beef is juicy, delicious, and very fat. The island abounds with goats, rabbits, a

small breed of horses, ring-pheasants, red-legged partridges, rice-birds, pigeons, &c. of some of which the breed is indigenous, but others have been brought from Africa, Europe, or the East Indies. The number of inhabitants on the island does not exceed 2000, including near 500 soldiers, and 600 slaves, who are supplied with all sorts of manufactures by the company's ships, in return for refreshments; and many of the slaves are employed in catching fish, which are very plentiful. To Mr. Forster's account may be added, that the town is small, and stands in a valley at the bottom of a bay on the S side of the island, between two steep dreary mountains. The buildings, both public and private, are plain, but neat, and the town is well defended by forts and batteries. This island was discovered by the Portuguese, in 1502, on St. Helena's Day, whence it had its name. Afterward the Dutch were in possession of it till 1600, when they were expelled by the English. In 1673 the Dutch retook it by surprise: but it was soon after recovered by the brave captain Munden. This island is situated between the continents of Africa and S. America, about 1200 miles W. of the former, and 1800 E. of the latter. W. lon. 5. 49. S. lat. 15. 55.

HELEN, in fabulous history, the daughter of Tyndarus and Leda, was married to Menelaus king of Sparta, but was stolen from him by Theseus, 1235 B. C. She was restored soon after; but carried off again by Paris, the Trojan prince; which occasioned the famous Trojan war.

St. *HELENS*, a town of the Isle of Wight, in East-Medina, has a bay which runs a considerable way within land, and in a war with France is often the station and place of rendezvous for the royal navy. At the mouth of the bay is that cluster of rocks called the *Mixen*. It had an old church situated at the extremity of the coast, which was in danger of being washed away, as was a great part of the church-yard, which occasioned a new church to be built in 1719. The priory to which the old church belonged is now converted into a gentleman's seat; is in a remarkably pleasant situation, and commands a fine prospect of Portsmouth and the Road at Spithead. St. Helen's appears to have been of more consideration in former times than at present.

HELENUM, *BASTARD SUN FLOWER*; a genus of the polygamia superflua order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked in the middle; under the radius, paleaceous; the pappus consists of five short awns; the calyx is simple and multipartite; the florets of the radius semitrid. The *species* are, 1. The *autumnale*, with spear-shaped narrow leaves. 2. The *latifolium*, with pointed, spear-shaped, sawed leaves. Both these are natives of North America, where they grow wild in great plenty. They rise to the height of seven or eight feet in good ground. The roots, when large, send up a great number of stalks, which branch toward the top; the upper part of the stalk sustains one yellow flower, shaped like the sun-flower, but much smaller, having long rays, which are jagged pretty deep into four or five segments. These plants may be propagated by seeds, or by parting their roots; the latter is generally practised in this country. The best season to transplant and part the old roots is in October when their leaves are past, or in the beginning of March just before they begin to shoot. They delight in a soil rather moist than dry, provided it is not too strong, or does not hold the wet in winter.

HELENUS, in fabulous history, a celebrated soothsayer, son of Priam and Hecuba. He was greatly respected by all the Trojans. When Deiphobus was given in marriage to Helen in preference to himself, he resolved to leave his country, and retired to mount Ida, where Ulysses took him prisoner by the advice of Calchas. As he was well acquainted with futurity, the Greeks made use of prayers, threats, and promises, to induce

him to reveal the secrets of the Trojans; and either the fear of death, or gratification of resentment, seduced him to disclose to the enemies of his country, that Troy could not be taken whilst it was in possession of the Palladium, nor before Polydectes came from his retreat at Lemnos and assisted to support the siege. After the ruin of his country, he fell to the share of Pyrrhus the son of Achilles, and saved his life by warning him to avoid a dangerous tempest, which in reality proved fatal to all those who set sail. This endeared him to Pyrrhus; and he received from his hand Andromache the widow of his brother Hector, by whom he had a son called *Cestrimus*. This marriage, according to some, was consummated after the death of Pyrrhus, who lived with Andromache as with a wife. Helenus was the only one of Priam's sons who survived the ruin of his country. After the death of Pyrrhus he reigned over part of Epirus, which he called *Chaonia* in memory of his brother Chaon, whom he had inadvertently killed. Helenus received Aeneas as he voyaged towards Italy, and foretold him some of the calamities which attended his fleet. The manner in which he received the gift of prophecy is doubtful.

HELEPOLIS, in the ancient art of war, a machine for battering down the walls of a place besieged, the invention of which is ascribed to Demetrius Poliorcetes. Diodorus Siculus says, that each side of the Helepolis was 405 cubits in breadth and 90 in height; that it had nine stages, and was carried on four strong solid wheels eight cubits in diameter; that it was armed with large battering rams, and had two roofs capable of supporting them; that in the lower stages there were different sorts of engines for casting stones; and in the middle they had large catapultas for discharging arrows, and smaller ones in those above, with a number of expert men for working all these machines.

HELIADES, in mythology, the daughters of the Sun and Clymenes, according to the poets. They were so afflicted, as they say, with the death of their brother Phaeton, that the gods, moved with compassion, transformed them into poplars on the banks of the river Eridanus.

HELIACAL, in astronomy, a term applied to the rising and setting of the stars; or, more strictly speaking, to their emergence out of and immersion into the rays and superior splendor of the sun. A star is said to rise heliacally, when, after having been in conjunction with the sun, and on that account invisible, it comes to be at such a distance from him as to be seen in the morning before sun-rising; the sun, by his apparent motion, receding from the star towards the east. On the contrary, the heliacal setting is when the sun approaches so near a star as to hide it with his beams, which prevent the fainter light of the star from being perceived; so that the terms *apparition* and *occultation* would be more proper than *rising* and *setting*.

HELIÆA, in Grecian antiquity, was the greatest and most frequented court in Athens for the trial of civil affairs. See **HELIASTÆ**.

HELIANTHUS, the GREAT SUNFLOWER; a genus of the polygamia fruticosa order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is paleaceous and plane; the pappus diphyllous; the calyx imbricated; the scales standing a little out at the tops. There are 12 species, most of which are now very common in our gardens, though all of them are natives of America. They are all very hardy, and will thrive in almost any soil or situation. They may be propagated either by seeds or by parting their roots.

HELIASTÆ, in antiquity, the judges of the court **HELIÆA**. They were so called, according to some authors, from a Greek word which signifies *to assemble in a great number*; and, according to others, from another word which signifies *the sun*, because they held their assemblies in an open place. They com-

posed not only the most numerous, but likewise the most important of the Athenian tribunals; for their province was either to explain the obscure laws, or to give new vigour and authority to those which had been violated. The **Thesmothetæ** convoked the assembly of the **Heliastæ**, which sometimes amounted to 1000, sometimes to 1500, judges. Mr. Blanchard is of opinion, that, to make this number, the **Thesmothetæ** sometimes summoned those of each tribe who had last quitted the public offices which they had exercised in another court. However that may be, it appears that the assemblies of the **Heliastæ** were not frequent, as they would have interrupted the jurisdiction of the stated tribunals and the common course of affairs.

The **Thesmothetæ** paid to each member of this assembly, for his attendance, three oboli: which are equal to two Roman sesterces, or to half a drachma. Hence Aristophanes terms them *the brothers of the triobulus*. They were likewise condemned to pay a fine if they came too late; and if they did not present themselves till after the orators had begun to speak, they were not admitted. Their attendance was required out of the public treasury, and their pay was called *misthos heliasticus*.

The assembly met at first, according to Aristophanes, at the rising of the sun. If the judges were obliged to meet under cover on account of frost and snow, they had a fire; but there is not a passage in any ancient author which informs us of the place where these assemblies were held either in the rigorous or in the mild seasons. We only learn, that there was a double inclosure around the assembly, that it might not be disturbed. The first was a kind of arbour-work, from space to space, separated by doors, over which were painted in red the ten or twelve first letters of the Greek alphabet, which directed the entrance of the officers who composed the tribunal, each of them entering under the letter which distinguished his tribe. The beadles of the court, to whom they showed the wands which had been sent them by the **Thesmothetæ** as a summons to meet, examined its mark, to see if it was authentic, and then introduced them. The second inclosure, which was at the distance of 20 feet from the former, was a rope or cord; that the people who stood round the first inclosure, and were desirous to see what passed within the second, might not be prevented from gratifying their curiosity at a proper distance. Thus the attention of the judges was not interrupted by the concourse of the multitude, many of whom were heated by views of interest or of party.

To each of the members of the assembly were distributed two pieces of copper; one of which was perforated, not certainly that it might be distinguished from the other by feeling, for these assemblies met at the rising and were dissolved at the setting of the sun. Those pieces of copper had been substituted for little sea-shells, which were at first in use. The king was present at the assembly, at whose command it had been summoned. The **Thesmothetæ** read the names of those who were to compose it, and each man took his place as he was called. The **Thesmothetæ** were then sent for, whose function it was to observe prodigies and to superintend the sacrifices; and if they gave their sanction, the deliberations were begun. It is well known, that the officers called *Exegetæ* were often corrupted by those who were interested in the debates of the assembly; and that they excited such tumults as were raised by the Roman tribunal in the popular assemblies convoked by the consuls.

Of all the monuments which remain relating to the **Heliastæ**, the most curious is the oath which those judges took before the **Thesmothetæ**: Demosthenes hath preserved it in his oration against Timocrates, who having been bribed by those who had been intrusted with the effects taken on board a vessel of Naucratis, and refused to give an account of them, got a law passed, by which an enlargement was granted to prisoners for public debts on giving bail. Demosthenes, in making his oration

against that law, ordered the oath of the Heliaſtæ to be read aloud, as a perpetual auxiliary to his arguments, and happily calculated to intereſt the multitude and inflame their paſſions. This oath bore ample teſtimony how reſpectable a tribunal that of the Heliaſtæ was, and how important were their deciſions.

Ariſtotle informs us of another motive for the meeting of this aſſembly; this was, by the public authority deputed to them, to elect a magiſtrate in the room of one dead. It is ſurpriſing that Pausanias, who enters ſo often into details, gives us no particular account of this aſſembly. All that he ſays of it is, that the moſt numerous of the Athenian aſſemblies was called *Helicæ*.

We are told by Diogenes Laertius, in his Life of Solon, that it was before one of theſe Heliaſtic aſſemblies that Piſiſtratus preſented himſelf, covered with wounds and contuſions (for thus he had treated himſelf and the mules which drew his car), to excite the indignation of the people againſt his pretended enemies, who, jealous, as he alleged, of the popularity he had acquired by aſſerting the rights of his poorer fellow-citizens, in oppoſition to the men in power, had attacked him while he was hunting, and had wounded him in that barbarous manner. His deſign ſucceeded: a guard was appointed him; by the aſſiſtance of which he acquired the ſovereignty or tyranny of Athens, and kept it 33 years. The power of the aſſembly appeared remarkably on that occaſion; for Solon, who was preſent, oppoſed it with all his efforts, and did not ſucceed.

As to the manner in which the judges gave their ſuffrages, there was a ſort of veſſel covered with an oſier mat, in which were placed two urns, the one of copper, the other of wood. In the lid of theſe urns there was an oblong hole, which was large at the top, and grew narrower downwards, as we ſee in ſome old boxes of our churches. The ſuffrages which condemned the accuſed perſon were thrown into the wooden urn, which was termed *kyrios*. That of copper, named *akyros*, received thoſe which abſolved him.

Ariſtotle obſerves, that Solon, whoſe aim was to make his people happy, and who found an ariſtocracy eſtabliſhed by the election of the nine archons (annual officers, whoſe power was almoſt abſolute), tempered their ſovereignty, by inſtituting the privilege of appealing from *them* to the people, who were to be aſſembled by lot to give their ſuffrage: after having taken the oath of the Heliaſtæ, in a place near the Panathenæum; where Hiſſus had, in former days, calmed a ſedition of the people, and bound them to unanimity by an oath. It has likewiſe been remarked, that the god Apollo was not invoked in the oath of the Heliaſtæ, as in the oaths of the other judges. We have obſerved, that he who took the oath of the Heliaſtæ, engaged that he would not be corrupted by ſolicitation or money. Thoſe who violated this part of their oath were condemned to pay a ſevere fine. The decemvirs at Rome made ſuch corruption a capital crime. But Aſconius remarks, that the puniſhment denounced againſt them was mitigated in later times; and that they were expelled the ſenate, or baniſhed for a certain time, according to the degree of their guilt.

HELICON, in ancient geography, the name of a mountain in the neighbourhood of Parnalius and Cytheron, ſacred to Apollo and the muſes, who are thence called *Heliconides*. It is ſituated in Livadia, and now called *Zagura* or *Zaguya*. Helicon was one of the moſt fertile and woody mountains in Greece. On it the fruit of the adrachnus, a ſpecies of the arbutus or of the ſtrawberry-tree, was uncommonly ſweet; and the inhabitants aſſerted, that the plants and roots were all friendly to man, and that even the ſerpents had their poiſon weakened by the innoxious qualities of their food. It approached Parnalius on the north, where it touched on Phocis; and reſembled that mountain in loſtineſs, extent, and magnitude.

Here was the ſhady grove of the muſes and their images; with ſtatues of Apollo and Bacchus, of Linus and Orpheus, and the illuſtrious poets who had recited their verſes to the harp. Among the tripods, in the ſecond century, was that conſecrated by Heſiod. On the left-hand going to the grove was the fountain Aganippe; and about twenty ſtadia, or two miles and a half, higher up, the violet-coloured Hippocrene. Round the grove were houſes. A feſtival was celebrated there by the Theſpiæans with games called *Muſea*. The valleys of Helicon are deſcribed by Wheeler as green and flowery in the ſpring; and enlivened by pleaſing calcades and ſtreams, and by fountains and wells of clear water. The Bœotian cities in general, two or three excepted, were reduced to inconfiderable villages in the time of Strabo. The grove of the muſes was plundered under the auſpices of Conſtantine the Great. The Heliconian goddeſſes were afterwards conſumed in a fire at Conſtantinople, to which city they had been removed. Their ancient ſeat on the mountain, Aganippe and Hippocrene, are unascertained.

HELICONIA, in botany; a genus of the monogynia order, belonging to the pentandria claſs of plants. The ſpatha is univerſal and partial; there is no calyx; the corolla has three petals, and the neſtarium two leaves; the capſule is three-grained.

HELICTERES, the SCREW-TREE; a genus of the decandria order, belonging to the gynandria claſs of plants; and in the natural method ranking under the 37th order, *Columniferæ*. The calyx is monophyllous and oblique; there are five petals, and the neſtarium conſiſts of five petal-like leaſlets; the capſules are intorted or twisted inwards. There are four ſpecies, all natives of warm climates. They are ſhrubby plants, riſing from five to fourteen feet in height, adorned with flowers of a yellow colour. They are propagated by ſeeds; but are tender, and in this country muſt be kept in a ſtove during the winter.

St. HELIER, the capital of the iſland of Jerſey, in the Engliſh Channel, ſeated in the bay of St. Aubin, where it has a harbour, and a ſtone pier, having the ſea on the S. W. and hills on the N. that ſhelter it from the cold. Another large hill projects in a manner over the town, and has a pleaſant walk, that affords an extenſive proſpect. The ſtreets are wide and well-paved. The inhabitants are computed to be 2000. In the church, prayers are read alternately in Engliſh and French. At the top of the market-place is the ſtatue of George II. in bronze, gilt. In the church is a monument, erected at the public expence, to the memory of Major Pierſon, who fell in the moment of victory, in the attack of the French troops, who had made a deſcent on this iſland; in which action, the French general alſo was mortally wounded. W. lon. 2. 10. N. lat. 49. 11. See JERSEY.

St. HELIER, a little iſland, near the town of the ſame name, in the bay of St. Aubin, on the S. ſide of Jerſey. It took its name from Elerius, or Helier, a holy man, who lived in this iſland many centuries ago, and was ſlain by the Pagan Normans, at their coming here. He is mentioned among the martyrs in the Martyrology of Coutances. His little cell, with the ſtone bed, is ſtill ſhown among the rocks; and, in memory of him, a noble abbey was founded in this iſland. On the ſite of this abbey now ſtands Elizabeth Caſtle, a very large and ſtrong fortification. It is the reſidence of the governor and gariſon of St. Helier, and occupies the whole iſland, which is near a mile in circuit, and ſurrounded by the ſea at every half flood; and hence, at low water, is a paſſage to the town of St. Helier, called the Bridge, half a mile long and formed of ſand and ſtones.

HELIOCARPUS, in botany; a genus of the digynia order, belonging to the dodecandria claſs of plants; and in the natural method ranking under the 37th order, *Columniferæ*. The

calyx is tetraphyllous; the petals four; the styles simple; the capsule bilocular, compressed, and radiated lengthwise on each side.

HELIOCENTRIC LATITUDE of a Planet, the inclination of a line drawn between the centre of the sun and the centre of a planet to the plane of the ecliptic. The heliocentric place of a planet is the place of the ecliptic, wherein the planet would appear to a spectator placed at the centre of the sun.

HELIOCOMETES, a phenomenon sometimes observed about sun-setting; being a large luminous tail or column of light proceeding from the body of the sun, and dragging after it, not unlike the tail of a comet; whence the name.

HELIODORUS of PHOENICIA, bishop of Trica in Thessaly, better known by the romance he composed in his youth intitled *Ethiopics*, and relating the amours of Theagenes and Chariclea. Some say he was deposed by a synod because he would not consent to the suppressing that romance. The fable has a moral tendency, and particularly inculcates the virtue of chastity. As it was the first of this species of writing, he is styled the *Father of Romances*. He was also a good Latin poet. He lived in the 4th century.

HELIOMETER, formed of *ἥλιος* sun, and *μέτρον* I measure, the name of an instrument called also *astrometer*, invented by M. Bouguer in 1747, for measuring with particular exactness the diameters of the stars, and especially those of the sun and moon. This instrument is a kind of telescope, consisting of two object-glasses of equal focal distance, placed one of them by the side of the other, so that the same eye-glass serves for both. The tube of this instrument is of a conic form, larger at the upper end, which receives the two object glasses, than at the lower, which is furnished with an eye-glass and micrometer. By the construction of this instrument two distinct images of an object are formed in the focus of the eye-glass, whose distance, depending on that of the two object-glasses from one another, may be measured with great accuracy: nor is it necessary that the whole disc of the sun or moon come within the field of view; since, if the images of only a small part of the disc be formed by each object-glass, the whole diameter may be easily computed by their position with respect to one another: for if the object be large, the images will approach, or perhaps lie even over one another; and the object-glasses being moveable, the two images may always be brought exactly to touch one another, and the diameter may be computed from the known distance of the centres of the two glasses. Besides, as this instrument has a common micrometer in the focus of the eye-glass, when the two images of the sun or moon are made in part to cover one another, that part which is common to both the images may be measured with great exactness, as being viewed upon a ground that is only one half less luminous than itself; whereas, in general, the heavenly bodies are viewed upon a dark ground, and on that account are imagined to be larger than they really are. By a small addition to this instrument, provided it be of a moderate length, M. Bouguer thought it very possible to measure angles of three or four degrees, which is of particular consequence in taking the distance of stars from the moon. With this instrument M. Bouguer, by repeated observation, found, that the sun's vertical diameter, though somewhat diminished by the astronomical refraction, is longer than the horizontal diameter; and, in ascertaining this phenomenon, he also found, that the upper and lower edges of the sun's disc are not so equally defined as the other parts; on this account his image appears somewhat extended in the vertical direction. This is owing to the decomposition of light, which is known to consist of rays differently refrangible in its passage through our atmosphere. Thus the blue and violet rays, which proceed from the upper part of the disc at the same time with those of other colours, are somewhat more refracted than the others, and therefore seem to us to have

proceeded from a higher point; whereas, on the contrary, the red rays, proceeding from the lower edge of the disc, being less refracted than the others, seem to proceed from a lower point; so that the vertical diameter is extended, or appears longer, than the horizontal diameter. Mr. Servington Savery discovered a similar method of improving the micrometer, which was communicated to the Royal Society in 1743. See **MICROMETER**.

HELIOPHILA, in botany; a genus of the siliquosa order, belonging to the tetradynamia class of plants; and in the natural method ranking under the 39th order, *Siliquefæ*. There are two nectaria recurvated towards the vesicular base of the calyx.

HELIOPHOBI, a name given to the white negroes or albinos, from their aversion to the light of the sun. See **ALBINO**.

HELIOPOLIS, in ancient geography, so called by Herodotus and Diodorus Siculus, by Moses *On*, and in Jeremiah *Bethsemes*; a city of Egypt, to the south-east of the Delta, and east of Memphis; of a very old standing, its origin terminating in fable. Here stood the temple of the Sun, held in religious veneration. The city stood on an extraordinary mount, but in Strabo's time was desolate. It gave name to the *Nomes Heliopolites*. There was another *Heliopolis* in Cœlosyria, near the springs of the Orontes; so called from the worship of the Sun, which was in great vogue over all Syria.

HELIOSCOPE, in optics, a sort of telescope, peculiarly fitted for viewing the sun without hurting the eyes. See **TELESCOPE**. As the sun may be viewed through coloured glasses without hurt to the eyes, if the object and eye-glasses of a telescope be made of coloured glass, as red or green, such a telescope will become an helioscope. But Mr. Huygens only used a plain glass, blacked at the flame of a candle on one side, and placed between the eye-glass and the eye; which answers the design of an helioscope very well.

HELIOSTATA, in optics, an instrument invented by the late learned Dr. S. Gravesande; who gave it this name from its fixing, as it were, the rays of the sun in an horizontal direction across the dark chamber all the while it is in use. See **OPTICS**.

HELIOTROPE, *heliotropium*, among the ancients, an instrument or machine for showing when the sun arrived at the tropics and the equinoctial line. This name was also used for a sun-dial in general.

HELIOTROPE is also a precious stone, of a green colour, streaked with red veins. Pliny says it is thus called, because, when cast into a vessel of water, the sun's rays falling thereon seem to be of a blood colour; and that, when out of the water, it gives a faint reflection of the figure of the sun; and is proper to observe eclipses of the sun as a helioscope. The heliotrope is also called *oriental jasper*, on account of its ruddy spots. It is found in the East Indies, as also in Ethiopia, Germany, Bohemia, &c. Some have ascribed to it the faculty of rendering people invisible, like Gyges's ring.

HELIOTROPIUM, **TURNSOLE**; a genus of the polygynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 41st order, *Asperifoliae*. The corolla is salver-shaped and quinquefid, with lesser dents interjected alternately; the throat closed up by small arches formed in the corolla itself. There are a number of species, all of them natives of warm countries. Only one, called the *triccoccum*, grows in Europe; and is a native of France, Spain, and Italy. It is only remarkable for the property of its berries. See **COLOUR Making**.

HELIX, in geometry, a spiral line. See **SPIRAL**. The word is Greek, *ελίξ*, and literally signifies "a wreath or winding;" of *ἐλίσσω* *involve*, "I environ." In architecture some authors make a difference between the helix and the spiral. A

stair-case, according to Daviler, is in a helix, or is helical, when the stairs or steps wind round a cylindrical newel; whereas the spiral winds round a cone, and is continually approaching nearer and nearer its axis. *Helix* is also applied, in architecture, to the caulicules or little volutes under the flowers of the Corinthian capital; called also *uvillæ*.

HELIX, in anatomy, is the whole circuit or extent of the auricle or border of the ear outwards. In opposition to which, the inner protuberance surrounded thereby, and answering thereto, is called *anthelix*. See ANATOMY, p. 211.

HELIX, the *Snail*, in zoology, a genus belonging to the order of vermes testacea. The shell consists of one spiral, brittle, and almost diaphanous valve; and the aperture is narrow. There are 60 species, principally distinguished by the figure of their shells. They are of various sizes, from that of a small apple to less than half a pea. Some of them live on land, frequenting woods and gardens, or inhabiting clefts of rocks and dry sand-banks. Others of them are aquatic, inhabiting ponds, deep rivers, and the ocean.

The principal species are, 1. The *jantbina*, with a violet-coloured shell, is remarkable for the extreme thinness of its texture, which breaks with the least pressure, and seems therefore entirely calculated to keep the open sea, or at least to shun rocky shores. It inhabits the seas of Europe, especially the Mediterranean; those of Asia and Africa; and also the ocean. The living animal, when touched, exudes a juice which stains the hands of a violet colour. Dr. Hawkesworth, in his account of Cook's voyage, mistakes this shell for that which yielded the *purpura* of the ancients. But whoever looks into Pliny, can never have the least idea that the thin shell aforementioned could be the same with it. They had several shells which yielded the purple dye: but these were all rock-shells (see *BUCCINUM* and *MUREX*), and very different both in figure and hardness from the little helix *jantbina*; which is not calculated for the neighbourhood of rocks, as already mentioned. *Vid.* Plin. lib. v. cap. 1. and lib. ix. cap. 60, 61. See also Don Ant. Ulloa's Voyage to South America, book iv. ch. 8. 2. The *pomatia*, or exotic snail, with five spires, most remarkably ventricose, and fasciated with a lighter and a deeper brown, is a native of France, where it inhabits the woods; but has been naturalized in England, where it inhabits the woods of the southern counties. It was introduced, it is said, by Sir Kenelm Digby; whether for medical purposes, or as food, is uncertain: tradition says, that to cure his beloved wife of a decay was the object. They are quite confined to our southern counties. An attempt was made to bring them into Northamptonshire, but they would not live there. These are used as a food in several parts of Europe during Lent; and are preserved in an escargatoire, or a large plate boarded in, with a floor covered half a foot deep with herbs, in which the snails nestle and fatten. They were also a favourite dish with the Romans, who had their *cocblearia*, a nursery similar to the above. Fulvius Hirpinus was the first inventor of this luxury, a little before the civil wars between Cæsar and Pompey. The snails were fed with bran and sodden wine. If we could credit Varro, they grew so large, that the shells of some would hold ten quarts! People need not admire the temperance of the supper of the younger Pliny, which consisted of only a lettuce a-piece, three snails, two eggs, a barley-cake, sweet wine and snow, in case his snails bore any proportion in size to those of Hirpinus. Its name is derived not from any thing relating to an orchard, but from *πωμα*, an *operculum*, it having a very strong one. This seems to be the species described by Pliny, lib. viii. c. 39. which he says was scarce; that it covered itself with the opercle, and lodged under ground; and that they were at first found only about the maritime Alps, and more lately near Velitræ. See plate 3. where the figure appears of half the natural size. 3. The *bortensis*, or garden-snail,

is in form like the last, but less, and not umbilicated and clouded, or mottled with browns. It abounds with a viscid slimy juice, which it readily gives out by boiling in milk or water, so as to render them thick and glutinous. The decoctions in milk are apparently very nutritious and demulcent, and have been recommended in a thin acrimonious state of the humours, in consumptive cases and emaciations.

The eyes of snails are lodged in their horns, one at the end of each horn, which they can retract at pleasure. The manner of examining these eyes, which are four in number, is this: When the horns are out, cut off nimbly the extremity of one of them; and placing it before the microscope, you may discover the black spot at the end to be really a semiglobular eye. The dissection of this animal is very curious; for by this means the microscope not only discovers the heart beating just against the round hole near the neck, which seems the place of respiration, but also the liver, spleen, stomach, and intestines, with the veins, arteries, mouth and teeth, are plainly observable. The guts of this creature are green, from its eating of herbs, and are branched all over with fine capillary white veins: the mouth is like a hare's or rabbit's, with four or six needle-teeth, resembling those of leeches, and of a substance like horn. Snails are all hermaphrodites, having both sexes united in each individual. They lay their eggs with great care in the earth, and the young ones are hatched with shells completely formed. Cutting off a snail's head, a little stone appears, which is supposed to be a great diuretic, and good in all nephritic disorders. Immediately under this stone the heart is seen beating; and the auricles are evidently distinguishable; and are membranous, and of a white colour; as are also the vessels which proceed from them.

Snails discharge their excrements at a hole in their neck; they also breathe by this hole, and their parts of generation are situated very near it. The penis is very long, and in shape resembles that of a whale. In the process of generation, it has been observed, that with the male and female part there issues, at the aperture of the neck, a kind of spear, shaped like the head of a lance, and terminating in a very acute point: and when the two snails turn the clefts in their necks towards each other, the spear issuing from one pricks the other, and then either drops to the ground or is carried off by the snail it has pricked. The snail instantly withdraws, but soon after rejoins the other, which it pricks in its turn; and after such mutual puncture, the copulation never fails of being consummated. Snails are said to couple three times at the distance of about fifteen days from each other, nature producing a new spear for each time of copulation, which last ten or twelve hours. At the end of about eighteen days they bring forth their eggs by the aperture of their neck.

So small an animal as the snail is not free from the plague of supporting other smaller animals on its body; and as in other animals we find these secondary ones either living only on their surface, as lice, &c. or only in the intestines, as worms, it is very remarkable that this creature infests the snail in both these manners; being found sometimes on the surface of its body and sometimes within its intestines. There is a part of the common garden snail, and of other of the like kinds, commonly called the *collar*. This surrounds the neck of the snail, and is considerably thick, and is the only part that is visible when the animal is retired quietly into its shell. In this state of the animal these insects which infest it are usually seen in considerable numbers marching about very nimbly on this part: besides, the snail, every time it has occasion to open its anus, gives them a place by which to enter into its intestines, and they often seize the opportunity.

Snails are great destroyers of fruit in our gardens, especially the better sorts of wall-fruit. Lime and ashes sprinkled on the

ground where they most resort will drive them away, and destroy the young brood of them: it is a common practice to pull off the fruit they have bitten; but this should never be done, for they will eat no other till they have wholly eat up this if it be left for them.

HELL, the place of divine punishment after death. As all religions have supposed a future state of existence after this life, so all have their hell or place of torment in which the wicked are supposed to be punished. The hell of the ancient heathens was divided into two mansions; the one called *Elysium*, on the right hand, pleasant and delightful, appointed for the souls of good men; the other called *Tartara*, on the left, a region of misery and torment appointed for the wicked. The latter only was hell, in the present restrained sense of the word. See *ELYSIUM*.

The philosophers were of opinion, that the infernal regions were at an equal distance from all the parts of the earth; nevertheless it was the opinion of some, that there were certain passages which led thither, as the river Lethe near the Syrtes, and the Acherusian cave in Epirus. At Hermione it was thought, that there was a very short way to hell; for which reason the people of that country never put the fare into the mouths of the dead to pay their passage.

The Jews placed hell in the centre of the earth, and believed it to be situated under waters and mountains. According to them, there are three passages leading to it: the first is in the wilderness, and by that Korah, Dathan, and Abiram, descended into hell; the second is in the sea, because Jonah, who was thrown into the sea, cried to God out of the belly of hell; the third is in Jerusalem, because it is said the fire of the Lord is in Zion, and his furnace is in Jerusalem. They likewise acknowledged seven degrees of pain in hell, because they find this place called by seven different names in scripture. Though they believed that infidels, and persons eminently wicked, will continue for ever in hell; yet they maintained, that every Jew who is not infected with some heresy, and has not acted contrary to the points mentioned by the rabbins, will not be punished therein for any other crimes above a year at most.

The Mahometans believe the eternity of rewards and punishments in another life. In the Koran it is said, that hell has seven gates, the first for the Mussulmans, the second for the Christians, the third for the Jews, the fourth for the Sabians, the fifth for the Magians, the sixth for the Pagans, and the seventh for the Hypocrites of all religions.

Among Christians, there are two controverted questions in regard to hell; the one concerns locality, the other the duration of its torments. 1. The locality of hell, and the reality of its fire, began first to be controverted by Origen. That father, interpreting the scripture account metaphorically, makes hell to consist, not in external punishments, but in a consciousness or sense of guilt, and a remembrance of past pleasures. Among the moderns, Mr. Whiston advanced a new hypothesis. According to him, the comets are so many hells appointed in their orbits alternately to carry the damned into the confines of the sun, there to be scorched by its violent heat, and then to return with them beyond the orb of Saturn, there to starve them in these cold and dismal regions. Another modern author, not satisfied with any hypothesis hitherto advanced, assigns the sun to be the local hell. 2. As to the second question, viz. the duration of hell-torments, we have Origen again at the head of those who deny that they are eternal; it being that father's opinion, that not only men, but devils, after a due course of punishment suitable to their respective crimes, shall be pardoned and restored to heaven. The chief principle upon which Origen built his opinion, was the nature of punishment, which he took to be emendatory, applied only as physic for the recovery of the patient's health. The chief objection to the eternity of hell torments

among modern writers, is the disproportion between temporary crimes and eternal punishments. Those who maintain the affirmative, ground their opinions on scripture accounts, which represent the pains of hell under the figure of a worm which never dies, and a fire which is not quenched; as also upon the words, "These shall go away into everlasting punishment, but the righteous into life eternal."

HELLANICUS of Mitylene, a celebrated Greek historian, born before Herodotus, flourished about 480 B. C. He wrote a history of the ancient kings and founders of cities, but which hath not come down to us.

HELLAS, in ancient geography, an appellation comprising, according to the more ancient Greeks and Romans, Achaia and Peloponnesus, but afterwards restrained to Achaia. It was bounded on the west by the river Achelous, on the north by the mountains Othrys and Oëta, on the east by the Egean sea, and on the south by the Saronic and Corinthian bays, and by the isthmus which joins it to Peloponnesus. It was called *Hellas*, from Hellen the son of Deucalion; or from Hellas, a district of Thesfaly; whence *Hellenes*, the gentilitious name, denoting Greeks. Now called *Livadia*.

HELLE, in fabulous history, a daughter of Athamas king of Thebes by Nephele. She fled from her father's house with her brother Phryxus, to avoid the cruel oppression of her mother-in-law Ino. According to some accounts she was carried through the air on a golden ram which her mother had received from Neptune, and in her passage she became giddy and fell from her seat into that part of the sea which from her received the name of *Hellefont*. Others say that she was carried on a cloud, or rather upon a ship, from which she fell into the sea and was drowned. Phryxus, after he had given his sister a burial on the neighbouring coasts, pursued his journey and arrived in Colchis.

HELLEBORE. See HELLEBORUS.

White-HELLEBORE. See VERATRUM.

HELLEBORUS, HELLEBORE; a genus of the polygynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 26th order, *Multiflorae*. There is no calyx; but five or more petals: the nectaria are bilabiated and tubular; the capsules polyspermous, and a little erect.

The most remarkable species described of this plant is the niger, commonly called *Christmas rose*. It hath roots composed of many thick fleshy spreading fibres, crowned by a large cluster of lobed leaves, consisting each of seven or eight obtuse fleshy lobes, united to one foot-stalk; and between the leaves several thick fleshy flower stalks three or four inches high, surmounted by large beautiful white flowers of five roundish petals, and numerous filaments, appearing in winter, about or soon after Christmas.

This plant may be propagated either by seeds or parting the roots. It prospers in the open borders, or may be planted in pots to move when in bloom in order to adorn any particular place; but it always flowers fairest and most abundantly in the front of a warm sunny border. The plants may be removed, and the roots divided for propagation, in September, October, or November; but the sooner in autumn it is done, the stronger will the plants flower at their proper season.

The root of this plant was anciently used as a cathartic. The taste of it is acrid and bitter. Its acrimony, as Dr. Grew observes, is first felt on the tip of the tongue, and then spreads itself immediately to the middle, without being much perceived in the intermediate part. On chewing the root for a few minutes, the tongue seems benumbed, and affected with a kind of paralytic stupor, as when burnt by eating any thing too hot. The fibres are more acrimonious than the head of the root from whence they issue. Black hellebore root, taken from 15 to 30 grains, proves a strong cathartic; and, as such, has been celebrated for

the cure of maniacal disorders, and such also as were attributed to what the ancients called the *atra bilis*. In mania, however, this root appears by no means to be possessed of any specific power. It does not indeed appear, that our black hellebore acts with so much violence as that of the ancients; whence many have supposed it to be a different species of plant: and indeed the descriptions which the ancients have left us of their hellebore, do not agree with those of any of the sorts usually taken notice of by modern botanists. Another species has been discovered in the eastern countries, which Tournefort distinguishes by the name of *belleborus niger orientalis*, *amplissimo folio, caule prostrato, flore purpurascens*, and supposes to be the true ancient hellebore, from its growing in plenty about mount Olympus, and in the island of Anticyra, celebrated of old for the production of this antimaniacal drug: he relates, that a scruple of this sort, given for a dose, occasioned convulsions. Our hellebore is looked upon principally as an alterative; and is sometimes employed, in small doses, for promoting the uterine and urinary discharges, &c. It proves a powerful emmenagogue in plethoric habits, where steel is ineffectual or improper. In some parts of Germany, a species of black hellebore has been made use of, which frequently produced violent, and sometimes deleterious, effects. It appears to be the fetid kind of Linnaeus, called in English *settlewort*, *fetterwort*, or *bastard hellebore*. The roots of this may be distinguished from those of the true kind, by their being less black.

HELLEN, the son of Deucalion, is said to have given the name of Hellenists to the people before called *Greeks*, 1521 B. C.

HELLENISM, in language, a phrase in the idiom, genius, or construction of the Greek tongue. This word is only used when speaking of the authors who, writing in a different language, express themselves in a phraseology peculiar to the Greek.

HELLENISTIC LANGUAGE, that used by the Grecian Jews who lived in Egypt and other parts where the Greek tongue prevailed. In this language it is said the Septuagint was written, and also the books of the New Testament; and that it was thus denominated to show that it was Greek filled with Hebraisms and Syriacisms.

HELLENISTS, *Hellenistæ*, a term occurring in the Greek text of the New Testament, and which in the English version is rendered Grecians. The critics are divided as to the signification of the word. Œcumenius, in his Scholia on Acts vi. i. observes, that it is not to be understood as signifying those of the religion of the Greeks, but those who spoke Greek, *τῆς ἑλληνικῆς φωνῆς ὁμιλοῦντες*. The authors of the Vulgate version, indeed, render it like ours, *Greci*; but Messieurs Du Port Royal more accurately, *Juifs Grecs*, Greek or Grecian Jews; it being the Jews who spoke Greek that are here treated of, and who are hereby distinguished from the Jews called *Hebrews*, that is, who spoke the Hebrew tongue of that time. The Hellenists, or Grecian Jews, were those who lived in Egypt and other parts where the Greek tongue prevailed. It is to them we owe the Greek version of the Old Testament, commonly called the *Septuagint*, or that of the Seventy. Salmasius and Vossius are of a different sentiment with regard to the Hellenists. The latter will only have them to be those who adhered to the Grecian interests. Scaliger is represented, in the Scaligerana, as asserting the Hellenists to be the Jews who lived in Greece and other places, and who read the Greek Bible in their synagogue, and used the Greek language in *saeris*; and thus they were opposed to the Hebrew Jews, who performed their public worship in the Hebrew tongue; and in this sense St. Paul speaks of himself as a Hebrew of the Hebrews, Phil. iii. 5. i. e. a Hebrew both by nation and language. The Hellenists are thus properly distinguished from the *Hellenes* or *Greeks*, mentioned John

xii. 20. who were Greeks by birth and nation, and yet profelytes to the Jewish religion.

HELLENODICÆ, *ἑλληνοδικαί*, in antiquity, the directors of the Olympian games. At first there was only one, afterwards the number increased to two and to three, and at length to nine. They assembled in a place called *ἑλληνοδικαίον*, in the Elean forum, where they were obliged to reside ten months before the celebration of the games, to take care that such as offered themselves to contend, performed their *προγυμνασματα*, or preparatory exercises, and to be instructed in all the laws of games by certain men called *νομοφύλακες*, i. e. "keepers of the laws." And the better to prevent all unjust practices, they were farther obliged to take an oath, that they would act impartially, would take no bribes, nor discover the reason for which they disliked or approved of any of the contenders. At the solemnity they sat naked, having before them the victorial crown till the exercises were finished, and then it was presented to whomsoever they adjudged it. Nevertheless, there lay an appeal from the *hellenodicæ* to the Olympian senate.

HELLESPONT, a narrow strait between Asia and Europe, near the Propontis, which received its name from HELLE, who was drowned there in her voyage to Colchis. It is celebrated for the love and death of Leander, and for the bridge of boats which Xerxes built over it when he invaded Greece. The folly of this great prince is well known in beating and fettering the waves of the sea, whose impetuosity scattered his ships, and rendered all his labours ineffectual. It is now called the *Dardanelles*. It is about 33 miles long, and in the broadest parts the Asiatic coast is about one mile and a half distant from the European, and only half a mile in the narrowest, according to modern investigation, and the cocks are heard crowing from the opposite shores.

HELM, a long and flat piece of timber, or an assemblage of several pieces, suspended along the hind part of a ship's stern-post, where it turns upon hinges to the right, or left, serving to direct the course of the vessel, as the tail of a fish guides the body. The helm is usually composed of three parts, viz. the rudder, the tiller, and the wheel, except in small vessels, where the wheel is unnecessary. As to the form of the rudder, it becomes gradually broader in proportion to its distance from the top, or to its depth under the water. The back, or inner part of it, which joins to the stern-post, is diminished into the form of a wedge throughout its whole length, so as that the rudder may be more easily turned from one side to the other, where it makes an obtuse angle with the keel. It is supported upon hinges, of which those that are bolted round the stern-post to the after extremity of the ship, are called *googings*, and are furnished with a large hole on the after-part of the stern-post. The other parts of the hinges, which are bolted to the back of the rudder, are called *pintles*, being strong cylindrical pins, which enter into the googings, and rest upon them. The length and thickness of the rudder is nearly equal to that of the stern-post.

The rudder is turned upon its hinges by means of a long bar of timber, called the *tiller*, which is fixed horizontally in its upper end within the vessel. The movements of the tiller to the right and left, accordingly, direct the efforts of the rudder to the government of the ship's course as she advances; which, in the sea-language, is called *steering*. The operations of the tiller are guided and assisted by a sort of tackle, communicating with the ship's side, called the *tiller-rope*, which is usually composed of untarred rope-yarns for the purpose of traversing more readily through the blocks or pulleys.

In order to facilitate the management of the helm, the tiller-rope, in all large vessels, is wound about a wheel, which acts upon it with the powers of a crane or windlass. The rope employed in this service being conveyed from the fore-end of the tiller *k*, to a single block *i*, on each side of the ship, (see DECK

pl. 90. vol. ii.), is farther communicated to the wheel, by means of two blocks suspended near the mizzen-mast, and two holes immediately above, leading up to the wheel, which is fixed upon an axis on the quarter-deck, almost perpendicularly over the fore-end of the tiller. Five turns of the tiller-rope are usually wound about the barrel of the wheel; and, when the helm is amidship, the middle turn is nailed to the top of the barrel, with a mark by which the helmsman readily discovers the situation of the helm, as the wheel turns it from the starboard to the larboard side. The spokes of the wheel generally reach about eight inches beyond the rim or circumference, serving as handles to the person who steers the vessel. As the effect of a lever increases in proportion to the length of its arm, it is evident that the power of the helmsman to turn the wheel will be increased according to the length of the spokes beyond the circumference of the barrel.

When the helm, instead of lying in a right line with the keel, is turned to one side or the other, as represented in BD, pl. 3. it receives an immediate shock from the water, which glides along the ship's bottom in running *aft* from A to B; and this fluid pushes it towards the opposite side, whilst it is retained in this position: so that the stern, to which the rudder is confined, receives the same impression, and accordingly turns from B to *b* about some point *c*, whilst the head of the ship passes from A to *a*. It must be observed, that the current of water falls upon the rudder obliquely, and only strikes it with that part of its motion which acts according to the sine of incidence, pushing it in the direction NP, with a force which not only depends on the velocity of the ship's course, by which this current of water is produced, but also upon the extent of the sine of incidence. This force is by consequence composed of the square of the velocity with which the ship advances, and the square of the sine of incidence, which will necessarily be greater or smaller according to circumstances; so that if the vessel runs three or four times more swiftly, the absolute shock of the water upon the rudder will be nine or 16 times stronger under the same incidence: and, if the incidence is increased, it will yet be augmented in a greater proportion, because the square of the sine of incidence is more enlarged. This impression, or, what is the same thing, the power of the helm, is always very feeble, when compared with the weight of the vessel; but as it operates with the force of a long lever, its efforts to turn the ship are extremely advantageous. For the helm being applied to a great distance from the centre of gravity G, or from the point about which the vessel turns horizontally, if the direction PN of the impression of the water upon the rudder be prolonged, it is evident that it will pass perpendicularly to R, widely distant from the centre of gravity G: thus the absolute effort of the water is very powerful. It is not therefore surprising, that this machine impresses the ship with a considerable circular movement, by pushing the stern from B to *b*, and the head from A to *a*; and even much farther whilst she sails with rapidity, because the effect of the helm always keeps pace with the velocity with which the vessel advances.

Amongst the several angles that the rudder makes with the keel, there is always one position more favourable than any of the others, as it more readily produces the desired effect of turning the ship, in order to change her course. To ascertain this, it must be considered, that if the obliquity of the rudder with the keel is greater than the obtuse angle ABD, so as to diminish that angle, the action of the water upon the rudder will increase, and at the same time oppose the course of the ship in a greater degree; because the angle of incidence will be more open, so as to present a greater surface to the shock of the water, by opposing its passage more perpendicularly. But at that time the direction NP of the effort of the helm upon the ship will pass with a smaller distance from the centre of gravity G to-

wards R, and less approach the perpendicular NL, according to which it is absolutely necessary that the power applied should act with a greater effect to turn the vessel. Thus it is evident, that if the obtuse angle ABD is too much inclosed, the greatest impulse of the water will not counterbalance the loss sustained by the distance of the direction NP from NL, or by the great obliquity which is given to the same direction NP of the absolute effort of the helm with the keel AB. If, on the contrary, the angle ABD is too much opened, the direction NP of the force of the action of the helm will become more advantageous to turn the vessel, because it will approach nearer the perpendicular NL; so that the line prolonged from NP will increase the line GR, by removing R to a greater distance from the centre of gravity G: but then the helm will receive the impression of the water too obliquely, for the angle of incidence will be more acute; so that it will only present a small portion of its breadth to the shock of the water, and by consequence will only receive a feeble effort. By this principle it is easy to conceive, that the greatest distance GR from the centre of gravity G, is not sufficient to repair the diminution of force occasioned by the too great obliquity of the shock of the water. Hence we may conclude, that when the water either strikes the helm too directly, or too obliquely, it loses a great deal of the effect it ought to produce. Between the two extremes there is therefore a mean position, which is the most favourable to its operations.

The diagonal NP of the rectangle IL represents the absolute direction of the effort of the water upon the helm. NI expresses the portion of this effort which is opposed to the ship's head-way, or which pushes her astern, in a direction parallel to the keel. It is easily perceived, that this part NI of the whole power of the helm contributes but little to turn the vessel; for, if IN is prolonged, it appears that its direction approaches to a very small distance GV from the centre of gravity G; and that the arm of the lever BN = GV, to which the force is applied, is not in the whole more than equal to half the breadth of the rudder: but the relative force NL, which acts perpendicular to the keel, is extremely different. If the first NI is almost useless, and even pernicious, by retarding the velocity; the second NL is capable of a very great effect, because it operates at a considerable distance from the centre of gravity G of the ship, and acts upon the arm of a lever GE, which is very long. Thus it appears, that between the effects NL and NI, which result from the absolute effort NP, there is one which always opposes the ship's course, and contributes little to her motion of turning; whilst the other produces only this movement of rotation, without operating to retard her velocity.

Geometricians have determined the most advantageous angle made by the helm with the line prolonged from the keel, and fixed it at $54^{\circ} 44'$, presuming that the ship is as narrow at her floating-line, or at the line described by the surface of the water round her bottom, as at the keel. But as this supposition is absolutely false, inasmuch as all vessels augment their breadth from the keel upward to the extreme breadth, where the floating-line or the highest water-line is terminated; it follows, that this angle is too large by a certain number of degrees. For the rudder is impressed by the water, at the height of the floating-line, more directly than at the keel, because the fluid exactly follows the horizontal outlines of the bottom; so that a particular position of the helm might be supposed necessary for each different incidence which it encounters from the keel upwards. But as a middle position may be taken between all these points, it will be sufficient to consider the angle formed by the sides of the ship, and her axis, or the middle-line of her length, at the surface of the water, in order to determine afterwards the mean point, and the mean angle of incidence.

It is evident that the angle $54^{\circ} 44'$ is too open, and very unfavourable to the ship's head-way, because the water acts upon

the rudder there with too great a sine of incidence, as being equal to that of the angle which it makes with the line prolonged from the keel below: but above, the shock of the water is almost perpendicular to the rudder, because of the breadth of the bottom, as we have already remarked. If then the rudder is only opposed to the fluid, by making an angle of 45° with the line prolonged from the keel, the impression, by becoming weaker, will be less opposed to the ship's head-way, and the direction NP of the absolute effort of the water upon the helm drawing nearer to the lateral perpendicular, will be placed more advantageously, for the reasons above mentioned. On the other hand, experience daily testifies, that a ship steers well when the rudder makes the angle DBE equal to 35° only.

It has been already remarked, that the effect of moving the wheel to govern the helm increases in proportion to the length of the spokes; and so great is the power of the wheel, that if the helmsman employs a force upon its spokes equivalent to 30 pounds, it will produce an effect of 90 or 120 pounds upon the tiller. On the contrary, the action of the water is collected into the middle of the breadth of the rudder, which is very narrow in comparison with the length of the tiller; so the effort of the water is very little removed from the fulcrum B upon which it turns; whereas the tiller forms the arm of a lever 10 or 15 times longer, which also increases the power of the helmsman in the same proportion that the tiller bears to the lever upon which the impulse of the water is directed. This force then is by consequence 10 or 15 times stronger; and the effort of 30 pounds, which at first gave the helmsman a power equal to 90 or 120 pounds, becomes accumulated to one of 900 or 1800 pounds upon the rudder. This advantage then arises from the shortness of the lever upon which the action of the water is impressed, and the great comparative length of the tiller, or lever, by which the rudder is governed; together with the additional power of the wheel that directs the movements of the tiller, and still farther accumulates the power of the helmsman over it. Such a demonstration ought to remove the surprise with which the prodigious effect of the helm is sometimes considered, from an inattention to its mechanism: for we need only to observe the pressure of the water, which acts at a great distance from the centre of gravity G, about which the ship is supposed to turn, and we shall easily perceive the difference there is between the effort of the water against the helmsman, and the effect of the same impulse against the vessel. With regard to the person who steers, the water acts only with the arm of a very short lever NB, of which B is the fulcrum: on the contrary, with regard to the ship, the force of the water is impressed in the direction NP, which passes to a great distance from G, and acts upon a very long lever EG, which renders the action of the rudder extremely powerful in turning the vessel; so that, in a large ship, the rudder receives a shock from the water of 2700 or 2800 pounds, which is frequently the case when she sails at the rate of three or four leagues by the hour; and this force being applied in E, perhaps 100 or 110 feet distant from the centre of gravity G, will operate upon the ship, to turn her about, with 270,000 or 308,000 pounds; whilst, in the latter case, the helmsman acts with an effort which exceeds not 30 pounds upon the spokes of the wheel.

After what has been said of the helm, it is easy to judge, that the more a ship increases her velocity with regard to the sea, the more powerful will be the effect of the rudder; because it acts against the water with a force, which increases as the square of the swiftness of the fluid, whether the ship advances or retreats; or, in other words, whether she has head-way or stern-way; with this distinction, that in these two circumstances the effects will be contrary. For if the vessel retreats, or moves astern, the helm will be impressed from I to N; and instead of being pushed, according to NP, it will receive the effort of the

water from N towards R; so that the stern will be transported to the same movement, and the head turned in a contrary direction. When the helm operates by itself, the centre of rotation of the ship, and her movement, are determined by estimating the force of this machine; that is to say, by multiplying the surface of the rudder by the square of the ship's velocity.

There are several terms in the sea-language relating to the helm; as, *Bear up the helm*; that is, Let the ship go more large before the wind. *Helm a mid-ship*, or *right the helm*: that is, Keep it even with the middle of the ship. *Port the helm*, Put it over the left side of the ship. *Starboard the helm*, Put it on the right side of the ship.

HELMET, an ancient defensive armour worn by horsemen both in war and in tournaments. It covered both the head and face, only leaving an aperture in the front secured by bars, which was called the *visor*. In achievements, it is placed above the escutcheon as the principal ornament, and is the true mark of chivalry and nobility. Helmets vary according to the different degrees of those who bear them. They are also used as a bearing in coats of arms. See HERALDRY.

HELMINTHOLITHUS, in natural history, a name given by Linnæus to petrified bodies resembling worms. Of these he reckons four genera. 1. Petrified lithophyta, found in the mountains of Sweden. 2. Petrified shells. 3. Petrified zoophytes. 4. Petrified reptiles.

HELMONT (John Baptist Van), a celebrated Flemish gentleman, was born at Brussels in 1577. He acquired such skill in natural philosophy, physic, and chemistry, that he was accounted a magician, and thrown into the inquisition: but having with difficulty justified himself, as soon as he was released he retired to Holland; where he died in 1644. He published, 1. *De magnetica corporum curatione*. 2. *Februm doctrina inaudita*. 3. *Ortus medicinæ*. 4. *Paradoxa de aquis spadanis*; and other works, printed together in one volume folio.

HELMONT, a small town in the Netherlands, in Dutch Brabant, and capital of the district of Peeland, with a good castle. It is seated on the river Aa, in E. long. 5. 37. N. lat. 51. 31.

HELMSDALE, a river of Sutherland-shire, in Scotland, which descends from the mountains bordering on Caithness-shire, and rolling over its rocky bottom toward the Ord of Caithness, becomes, at that place, deep, rapid, and dangerous, there being no bridge over the river. At its mouth, in the German Ocean, is a good salmon fishery.

HELMSLEY, or HELMSLEY-BLACKMORE, a town of the N. riding of Yorkshire, seated on the river Rye. The houses are well built of stone, and covered with slate. It had formerly a castle, and has now a market on Saturday. It is 20 miles N. of York, and 220 N. by W. of London. W. lon. 1. 9. N. lat. 54. 19.

HELMSTADT, a town of Germany, in the duchy of Brunswick, with a university; 22 miles N. E. of Brunswick. E. lon. 11. 16. N. lat. 52. 16.

HELONIAS, in botany; a genus of the trigynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 10th order, *Coronarie*. The corolla is hexapetalous; there is no calyx; and the capsule is trilocular.

HELOISE, famous for her unfortunate affection for her tutor Abelard, and for her Latin letters to him after they had retired from the world. She died abbess of Paraclet in 1163. See ABELARD.

HELOS, in ancient geography, a maritime town of Laconia, situated between Trinasus and Acrisæ, in Pausanias's time in ruins. The district was called *Helotæ*, and the people *Helotes*, *Helotæ*, *Helci*, and *Helentæ*, by Stephanus; and *Ilota*, by Livy. Being subdued by the Lacedæmonians, they were all

reduced to a state of public slavery, or made the slaves of the public, on these conditions, viz. that they neither could recover their liberty, nor be sold out of the territory of Sparta. Hence the term *ελωτεις*, in Harpogration, for being in a state of slavery; and hence also the Lacedæmonians called the slaves of all nations whatever *belotes*. *Heloticus* is the epithet.

HELOTS, in Grecian antiquity, the slaves of the Spartans. See **HELOS**. The freemen of Sparta were forbidden the exercise of any mean or mechanical employment, and therefore the whole care of supplying the city with necessaries devolved upon the Helots.

HELSINBURG. See **ELSIMBURG**.

HELSINGFORS, a town of Swedish Finland, in a romantic situation, on a rising shore, near several rocks and huge fragments of granite. The harbour is in the gulf of Finland, and is the most commodious of any in the province of that name. Helsingfors is 150 miles E. of Abo. E. lon. 25. 0. N. lat. 60. 20.

HELSINGIA, a province of Sweden, bounded on the north by Jemterland and Medelpadia, on the east by the Bothnic gulf, and on the south and west by Dalecarlia and Gestricia. It is full of mountains and forests, and the inhabitants are almost constantly employed in hunting and fishing. It has no cities: the principal towns are, Hudwickvald, Alta, and Dillsbo.

HELSINGIC CHARACTER, a peculiar kind of character found inscribed on stones in the province of Helsingia. The Runic and Helsingic characters may be easily transformed into each other.

HELSTON, a borough of Cornwall, with a market on Monday. It is seated on the river Cober, near its influx into the sea. It is one of those appointed for the coinage of the tin. A little below the town is a tolerable good harbour, where several of the tin ships take in their lading. It is well inhabited, and governed by a mayor, four aldermen, a town-clerk, and deputy recorder. Here is the largest market-house in the county. It is 11 miles S. W. of Falmouth, and 274 W. by S. of London. E. lon. 5. 15. N. lat. 50. 2.

HELVELLA, in botany; a genus of the natural order of fungi, belonging to the cryptogamia class of plants. The fungus is of the shape of a top.

HELVETIC, something that has a relation to the Switzers, or inhabitants of the Swiss cantons, who were anciently called *Helvetii*. The Helvetic body comprehends the republic of Switzerland, consisting of 13 cantons, which make so many particular commonwealths. By the laws and customs of the Helvetic body, all differences between the several states and republics are to be decided within themselves, without the intervention of any foreign power. The government of this body is chiefly democratic, with some mixture of the aristocratic.

HELVETII, a people of Belgica, in the neighbourhood of the Allobroges and the Provincia Romana; famed for bravery and a turn for war. Called *Civitas Helvetia*, and divided into four Pagi or Cantons; situated to the south and west of the Rhine, by which they were divided from the Germans; and extending towards Gaul, from which they were separated by mount Jura on the west, and by the Rhodanus and Lacus Lemanus on the south, and therefore called a Gallic nation (Tacitus, Cæsar, Strabo, Ptolemy, Pliny). Formerly a part of Celtic Gaul, but by Augustus assigned to Belgica.

HELVETIUS (Adrian), an eminent physician, born in Holland. After having studied physic at Leyden, he went to Paris, where he acquired great reputation in his profession. He introduced in France the use of ipecacuanha in the cure of dysenteries; a remedy which he at first kept secret, but was

ordered to make it public, and on that account received a gratification from the king of 1000 louis d'ors. He was made inspector-general of the hospitals in Flanders, physician to the duke of Orleans regent of France, &c.; and died at Paris in 1727, aged 65. He wrote a treatise on the most common diseases, and the remedies proper for their cure (the best edition of which is that of 1724, in two volumes octavo); and other works.

HELVETIUS (John-Claude), son of the above, was born in 1685, and died in 1755. He was physician to the queen, and greatly encouraged by the town as well as court. He was, like his father, inspector-general of the military hospitals. He was of the Academy of Sciences at Paris, of the Royal Society in London, and of the Academies of Prussia, Florence, and Bologna. He is the author of, 1. *Idée Générale de l'économie animale*, 1722, 8vo. 2. *Principia Physico-Medica, in tyronum Medicinæ gratiam conscripta*, 2 vols. 8vo. It may be proper farther to mention, that he is the father of the Monf. **HELVETIUS**, who wrote the celebrated book *De l'Esprit*; and whom Voltaire calls "a true philosopher;" but whose book was stigmatized by the authors of the *Journal de Trevoux*, and suppressed by the government.

HELVICUS (Christopher), professor of divinity, Greek, and the Oriental tongues, in the university of Gissen, died in the flower of his age in 1617; after having published several books, and projected more. The Hebrew language was so familiar to him, that he spoke it as fluently as his mother tongue. He was not only a good grammarian, but also an able chronologer. His chronological tables have been greatly esteemed, though they are not free from errors.

HELVIDIANS, a sect of ancient heretics, denominated from their leader Helvidius, a disciple of Auxentius the Arian, whose distinguishing principle was, that Mary, the mother of Jesus, did not continue a virgin, but had other children by Joseph.

HELVOETSLUYS, a seaport of the United Provinces, in Holland, on the island of Voorn. It is frequented by a great number of ships, particularly by the English packet-boats, from Harwich. It is five miles S. of the Briel. E. lon. 4. 23. N. lat. 51. 45.

HEMATITES. See **HÆMATITES**.

HEMELAR (John), an eminent antiquarian, and canon of Antwerp, in the 17th century, was born at the Hague; and wrote a work, entitled, *Expositio Numismatum imperatorum Romanorum à Julio Cæsare ad Heraclium*; which is very scarce, though it has had several editions.

HEMEROBAPTISTS, a sect among the ancient Jews, thus called from their washing and bathing every day in all seasons; and performing this custom with the greatest solemnity, as a religious rite necessary to salvation. Epiphanius, who mentions this as the fourth heresy among the Jews, observes, that in other points these heretics had much the same opinions as the Scribes and Pharisees; only that they denied the resurrection of the dead, in common with the Sadducees, and retained a few other of the improprieties of these last. The sects who pass in the East under the denomination of Sabians, calling themselves *Mendai Iahi*, or *the disciples of John*, and whom the Europeans entitle *the Christians of St. John*, because they yet retain some knowledge of the gospel, is probably of Jewish origin, and seems to have been derived from the ancient Hemerobaptists; at least it is certain, that that John, whom they consider as the founder of their sect, bears no sort of similitude to John the Baptist, but rather resembles the person of that name whom the ancient writers represent as the chief of the Jewish Hemerobaptists. These ambiguous Christians dwell in Persia and Arabia, and principally at Bassora; and their religion consists in bodily washings, performed frequently,

and with great solemnity, and attended with certain ceremonies which the priests mingle with this superstitious service.

HEMEROBIOUS, in zoology; a genus of insects of the neuroptera order; the characters of which are these. The mouth is furnished with two teeth; the palpi are four; the wings are deflected, but not plaited; and the antennæ are bristly, and longer than the breast. There are 15 species; principally distinguished by their colours. This insect takes the name of *hemerobius* from the shortness of its life, which, however, continues several days. In the state of larva it is a great devourer of plant-lice, for which it has had bestowed upon it the appellation of *lion of the plant-lice*. The hemerobii, even after their transformation, preserve their carnivorous inclination. Not satisfied with making war upon the plant-lice, who tamely let themselves be devoured, they do not spare each other. The eggs of this insect are borne upon small pedicles, which are nothing but a gum spun out by the hemerobius by raising up the hinder part of its abdomen, and by that means the egg remains fastened to the upper part of the thread. Those eggs are deposited upon leaves, and set in the form of bunches. They have been taken for parasitic plants. The larva, when hatched, finds there its food in the midst of plant-lice. In 15 or 16 days it has attained to its full growth. With its spinning-wheel at its tail, it makes itself a small, round, white, silky cocoon, of a close texture. In summer, at the end of three weeks, the hemerobius issues forth with its wings; but when the cocoon has not been spun till autumn, the chrysalis remains in it the whole winter, and does not undergo its final metamorphosis till the ensuing spring. The flight of this insect is heavy: some species have an excrementitious smell. One goes by the name of the *water-hemerobius*, because it lives mostly at the water-side.

HEMEROCALLIS, DAY-LILY, or *lily-asphodel*; a genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 10th order, *Coronariæ*. The corolla is campanulated, with the tube cylindrical; the stamina decussing downwards. The *Species* are, 1. The *flava*, or yellow day-lily, with strong fibrous roots, sending up large hollow keel-shaped leaves, two feet long, upright, leafless firm stalks two feet high; dividing at top into several foot-stalks, each terminated by one large liliaceous yellow flower of an agreeable odour. Of this there is a variety called the *hemerocallis minor*, or small yellow day-lily. 2. The *fulva*, reddish, or copper-coloured day-lily, hath roots composed of strong fleshy fibres and large oblong tubes; radical, keel-shaped, hollow, pointed leaves, a yard long, reflected at top; with leafless stalks three or four feet high, and large copper-coloured liliaceous flowers. These have large stamina, charged with a kind of brown-coloured farina; which, on being touched or smelled to, is discharged in great plenty all over the hands and face. Both these species are hardy, and will thrive any where. They may be easily propagated by parting their roots in autumn, or almost any time after flowering, or before they begin to flower.

HEMERODROMI, compounded of *ἡμερα* "day," and *δρομη* "course," &c. among the ancients, were sentinels or guards appointed for the security and preservation of cities and other places. They went out of the city every morning, as soon as the gates were opened, and kept all day patrolling round the place; sometimes also making excursions farther into the country, to see that there were no enemies lying in wait to surprise them.

HEMERODROMI were also a sort of couriers among the ancients, who only travelled one day, and then delivered their packets or dispatches to a fresh man, who ran his day, and so on to the end of the journey. The Greeks had of these sort of couriers, which they derived from the Persians, who were

the inventors thereof, as appears from Herodotus. Augustus had the same; at least he established couriers, who, if they did not relieve each other from day to day, yet did it from space to space, and that space was not very great.

HEMEROTROPHIS, in antiquity, a measure of capacity, the same with the *choenix*. It was so called from its holding one day's food. The word is compounded of *ἡμερα* a day, and *τροφη* food.

HEMI, a word used in the composition of various terms. It signifies the same with *femi* or *demi*, viz. "half;" being an abbreviature of *ἡμισυς* *hemisys*, which signifies the same. The Greeks retrenched the last syllable of the word *ἡμισυς* in the composition of words; and, after their example, we have done so too in most of the compounds borrowed from them.

HEMICRANIA, in medicine, a species of cephalalgia, or head-ach; wherein only one side of the head is affected. It is said to be owing to a congestion of blood in the vessels of that side, but it more frequently arises from sympathy with the stomach.

HEMICYCLE, **HEMICYCLUM**, compounded of *ἡμισυς* half, and *κυκλος* circle, a semicircle. This term is particularly applied, in architecture, to vaults in the cradle form; and arches or sweeps of vaults, constituting a perfect semicircle. To construct an arch of hewn stone, they divide the hemicycle into so many voussiors; taking care to make them an uneven number, that there be no joint in the middle, where the key-stone should be. See **KEY** and **BRIDGE**.

HEMICYCLUM was also a part of the orchestra in the ancient theatre. Scaliger, however, observes, it was no standing part of the orchestra; being only used in dramatic pieces, where some person was supposed to be arrived from sea, as in Plautus's *Rudens*. The ancients had also a sort of sun-dial, called *hemicyclium*. It was a concave semicircle, the upper end or cusp whereof looked to the north. There was a style, or gnomon, issuing from the middle of the hemicycle, whereof that point corresponding to the centre of the hemicycle represented the centre of the earth; and its shadow projected on the concavity of the hemicycle, which represented the space between one tropic and another, the sun's declination, the day of the month, hour of the day, &c.

HEMIMERIS, in botany; a genus of the angiospermia order, belonging to the didynamia class of plants. The capsule is bilocular, with one of the cells more gibbous than the other: the corolla is wheel-shaped; with one division greater, and inverse heart-shaped; the interstice of the divisions nectar-bearing.

HEMINA, in Roman antiquity, a liquid measure, which, according to Arbuthnot, was equal to half a wine-pint English measure; its contents being 2.818 solid inches.

HEMIOBOLON, a weight often mentioned by the ancient writers in medicine, and expressing the half of their obolus, or the twelfth part of a dram, that is, five grains.

HEMIONITIS, in botany; a genus of the natural order of filices, belonging to the cryptogamia class of plants. The fructifications are in lines decussating or crossing each other.

HEMIPLEGIA, or **HEMIPLEXIA**, among physicians, a palsy of one half of the body. See **MEDICINE**.

HEMIPTERA, derived from *ἡμισυς* half, and *πτερον* wing, in the Linnean system, the second order of insects, comprehending twelve genera, viz. the *blattæ*, *mantis*, *gryllus*, *fulgora*, *cicada*, *rotunda*, *u. p. c. m. c.*, *aphis*, *chermes*, *coccus*, and *thrips*, and a great number of species. See **ENTOMOLOGY**, **INSECTS**, and **ZOOLOGY**.

HEMISPHERE, **HEMISPHERIUM**, compounded of *ἡμισυς* half, and *σφαῖρα* sphere, in geometry, is one half of a globe or sphere, when divided into two by a plane passing through its centre. This term, in astronomy, is particularly used for one

half of the mundane sphere. The equator divides the sphere into two equal parts, called the *northern* and *southern hemispheres*. The horizon also divides the sphere into two parts, called the *upper* and the *lower hemispheres*.

HEMISPHERE is also used for a map, or projection, of half the terrestrial globe, or half the celestial sphere, on a plane. Hemispheres are frequently called *planispheres*.

HEMISTICH, in poetry, denotes half a verse, or a verse not completed. Of this there are frequent examples in Virgil's *Æneid*; but whether they were left unfinished by design or not, is disputed among the learned: such are, *Ferro accincta vocat*, *Æn.* II. v. 614. And, *Italiam non sponte sequor*, *Æn.* IV. v. 361. In reading common English verses, a short pause is required at the end of each hemistich or half-verse.

HEMITONE, in the ancient music, was what we now call a half note or semitone.

HEMITRITÆUS, in medicine, a kind of fever, denoting the same as semi-tertian, returning twice every day. The word is Greek, and compounded of *ἡμις* "half," and *τρίτατος* "third or tertian."

HEMLOCK, in botany. See *CICUTA* and *CONIUM*."

HEMOIPTOTON. See *ORATORY*.

HEMP. See *CANNABIS*. It does not appear that the ancients were acquainted with the use of hemp, in respect of the thread it affords. Pliny, who speaks of the plant in his natural history, lib. xx. cap. 23. says not a word of this; contenting himself with extolling the virtues of its stem, leaves, and root. In effect, what some writers of the Roman antiquities remark, viz. that the hemp necessary for the use of war was all stored up in two cities of the western empire, viz. at Ravenna and Vienne, under the direction of two procurators, called *procuratores lini-ficii*, must be understood of linum or flax.

The use of hemp is so extensive and important, that vast quantities of it are annually imported into this and other kingdoms from those countries where it grows in greatest plenty, of which Russia is one. In the year 1763, the quantity imported into England alone amounted to 11,000 tons. Sir John Sinclair informs us (*Annals of Agriculture*, vol. xiii. p. 508), that in the year 1785 the quantity exported from Petersburg in British ships was as follows:

	Poods.
Clean hemp - - -	1,038,791
Outshot - - -	37,382
Half-clean - - -	18,374
Hemp-codille - - -	19,251
	<hr/>
	1,113,798

Now, allowing 63 poods to a ton, the quantity just mentioned will amount to 17,695 tons; and supposing it to take five acres to produce a ton of hemp, the whole quantity of ground requisite for this purpose would amount to 88,475 acres.

By other accounts, the annual export of hemp to England is valued at 400,000l.; but by a computation of the whole imported into Britain and Ireland in 1788, it would seem that a considerably greater quantity must fall to the share of England. In that year the quantity amounted to no less than 58,464 tons; which at 20l. per ton amounted to 1,269,280l. We cannot wonder at this vast consumption, when it is considered that the sails and cordage of a first rate man of war require 180,000lb. of rough hemp for their construction; but even this will scarce account for the enormous consumption in France, which in the year 1783 is said to have amounted to upwards of 400 millions of pounds, or 200,000 tons; of which more than one third was imported.

Only the coarser kinds of hemp are employed in making cordage, the better sorts being used for linen, which, though it

can never be made so fine as that from flax, is yet incomparably stronger, and equally susceptible of bleaching both in the old and new way. Cloths made of hemp have also this property, that their colour improves by wearing, while that of linen decays. The prices of hemp-linen are various; from 10d. to 4s. 6d. per yard. The low-priced kinds are very generally worn in Suffolk (where hemp is cultivated) by husbandmen, servants, &c. those from 1s. 6d. to 2s. by farmers and tradesmen; and those from 2s. 6d. to 4s. 6d. are frequently preferred by gentlemen to flax-linen, on account of their strength and warmth. The English hemp is much superior in strength to that which grows in any other country. Next to it is the Russian, from which sackings are usually made, as it is sometimes also from the offal of the English kind, but none of the Suffolk hemp is ever made into cordage, on account of its fineness. A considerable quantity of Russia sheeting is imported into England merely on account of its strength, and is much coarser at the price than any other foreign linen.

Besides these uses of hemp, it is said to possess a property as a plant which renders it almost invaluable; viz. that of driving away almost all insects that feed upon other vegetables. Hence in some places of the continent they secure their crops from these mischievous attacks, by sowing a belt of hemp round their gardens, or any particular spot which they wish to preserve.

The important uses of hemp, and the superiority of that produced in Britain to other kinds, have rendered the culture of it an object of attention to government. Accordingly in the year 1787, a bounty of three-pence per stone was allowed on all the hemp raised in England; and probably with a view to encourage the growth of English hemp, duties have been laid on that which comes from abroad. Dressed hemp in a British ship pays 2l. 4s. per cwt. import duty; in a foreign one, 2l. 6s. 9d.; and in both cases a drawback of 1l. 19s. is allowed. Undressed hemp in a British ship pays 3s. 8d.; and in a foreign one 3s. 11d. In both cases the drawback is 3s. 4d. The export of British hemp is free.

The usual height of the plant when growing is from five to six feet, but this varies very considerably according to circumstances. That which is cultivated near Bischwiller in Alsace is sometimes more than 12 feet high, and upwards of three inches in circumference, the stalks being so deeply rooted that a very strong man can scarce pull them up. Mr. Arthur Young, in a tour through Catalonia in Spain, says, that where the country is well watered, the crops of hemp are extraordinary; and that the plants generally rise to the height of seven feet. In Italy hemp is generally cultivated, though the Bolognese only can pretend to any superiority in the management of it. It is there sown upon their best lands, which are rich strong loams; and on which they are at all possible pains to procure a fine friable surface. For manure they use dung, pieces of rotten cloth, feathers, and horns brought from Dalmatia. The plant, however, may be cultivated upon ground of every kind; the poorer land producing that which is finer in quality, though in smaller quantity; whereas strong and rich land produces a great quantity, but coarser. It does not exhaust the land on which it grows, like flax; whence it is probable, that if properly managed, and care taken in the cultivation, it might be found to supersede flax entirely. A Sussex manufacturer, who writes on this subject in the *Annals of Agriculture*, informs us, that it may be raised for many years successively on the same ground, provided it be well manured. An acre requires from nine to twelve pecks, according to the nature of the soil; the latter being the most usual, though a variation in the quality of the soil makes an alteration both in the quantity and quality of the hemp. An acre produces on an average 36 or 38 stone. The abbé Brulle, in a *Treatise upon the Culture and Management of*

Hemp, printed by order of the lords of the committee of council for trade and foreign plantations, informs us, that the season for sowing it extends from the 25th of March to the 15th of June. The seed ought always to be sown thin, not exceeding two bushels to an acre; and if you have the advantage of a drill plough, still less will answer. As there are two kinds of hemp, the male and female, of which the former only produces seed, some regard must be had to this circumstance. In Suffolk the male and female are pulled together about 13 weeks after the sowing, but in the fens they are frequently separated. This last method is recommended by the abbé Brulle, who, for the more easy accomplishment of it, directs that little paths should be made lengthwise through the field at about seven feet distance from each other, to allow a passage for the person who pulls up the female hemp from among the other; the latter requiring to stand more than a month after for the purpose of ripening the seeds. The female hemp is known to be ripe by the fading of the flowers, the falling of the farina secundans, and some of the stalks turning yellow. After the whole of this kind is pulled, it must be manufactured according to the directions to be afterwards given, and ought to be worked if possible while green; the hemp thus produced being much finer than that which is previously dried. The reason of this is, that the plant contains a great quantity of glutinous matter; which being once dried, agglutinates the fibres in such a manner that they can never be afterwards perfectly separated. The female hemp, however, is always in smaller quantity than the male; and therefore, where the crop is large, it will be impossible to work the whole as fast as it is pulled or cut. It is known to be ripe by the stems becoming pale; but it must be remembered, that hemp of any kind will be much less injured by pulling the plants before they are ripe than by letting them stand too long.

The male hemp being stripped of its leaves, &c. as afterwards directed, will soon be dry for storing by the heat of the atmosphere, though sometimes it may be necessary to use artificial means; but where these are used, the utmost care must be taken, hemp when dry being exceedingly inflammable. The stored or dried hemp must be steeped and treated in every other respect as though it had been green; whence it is evident that this operation ought never to be used but in cases of necessity. It is likewise impossible to make hemp which has been dried previous to its being steeped, so white as that which has been worked green.

With regard to the perfecting of hemp-seed for a subsequent season, it would seem proper to set apart a piece of ground for this purpose; for M. Aimen, from 40 plants raised in the common way, had only a pound and an half of seed, though the plants from which it was taken might be deemed fine; whereas, from a single plant which grew by itself, he had seven pounds and an half. Some are of opinion, that by putting the clusters which contain the hemp-seed to heat and sweat, the quality is improved; as many of those seeds which would otherwise wither and die, may thus arrive at perfection. This, however, seems to be very problematical; as there are no experiments which show that seeds, when separated from the vegetable producing them, have any power of meliorating themselves.

After the hemp is pulled, it must be taken in large handfuls, cutting off the roots (though this is not absolutely necessary), the leaves, seeds, and lateral branches, being dressed off with a wooden sword or ripple. It is then to be made up into bundles of twelve handfuls each, in order to be steeped, like flax, in water. This, or something similar, is absolutely necessary, in order to separate the bark; which is properly the hemp, from the reed or woody part. In Suffolk, this operation is called *water-retting*; but sometimes a mere exposure to the air is substituted in its place, turning the hemp frequently during the

time it is exposed. This is called *dew-retting*; but the former method is universally deemed preferable. Such hemp as is designed for seed is seldom water-retted, though in the opinion of the manufacturer already quoted, it would be better if it were so. Dew-retted hemp is generally stacked and covered during the winter; in January and February it is spread upon meadow land, and whitens with the frost and snow; though it is always much inferior to the other, and proper for coarser yarns only.

The length of time required for steeping hemp is various, and a complete knowledge of it can only be attained by practice. In Suffolk it is usual to continue the immersion four, five, or six days; standing water is preferred, and the same water will steep hemp three times during the season, but the first has always the best colour. The abbé Brulle prefers clear and running water, especially if overhung with trees. The bundles are to be laid crosswise upon each other, taking particular notice of the manner in which they lie when put in, that they may be taken out without difficulty. His time of steeping is from six to 11 days; and here we must observe, that it is much better to let it remain too long in the water than too short a time. The slenderest hemp requires the most soaking. The operation is known to be finished by the reed separating easily from the bark.

After the hemp is thoroughly steeped, the next operation is to separate the bark from the reed or woody part; and this may be done in two ways, viz. either pulling out the reed from every stalk with the hand, or drying and breaking it like flax. The abbé Brulle is very particular in his directions for this last operation, which he calls *reeding*, and which may be performed either in a trough under water or upon a table. The whole, however, may be reduced to the following, viz. pressing down the bundles either in the trough or on a table by proper weights, to keep the hemp steady on the middle and top end. Then beginning at the upper part of the bundle, pull out the reeds one by one. As you proceed, the rind which remains will press closely upon the remaining unreeded hemp, and keep it more steady; so that you may take two, four, or even six stalks at a time. The weight is then to be removed from the top, and all the pieces of reed which remain there having broken off in the former operation, are to be taken out. Lastly, the middle weight is to be taken off, and any small pieces which remain there taken out. If the reeding is performed on a table, the bundle must be weeded frequently, though slightly; a continual dropping of water would perhaps be the best method.

After the hemp is reeded, it must next be freed from the mucilaginous matter with which it still abounds. This is done by pouring water through it, squeezing out the liquid after every affusion, but taking care not to let the threads twist or entangle each other, which they will be very apt to do. The abbé is of opinion, that soft soap should be dissolved in the last water, in the proportion of an ounce to three pounds of dry hemp; which though not absolutely necessary, contributes much to the softening and rendering the hemp easy and pleasant to dress.

Hemp is broken by machinery, after being steeped, in a manner similar to flax; but the instruments used for this purpose in Suffolk are all worked by the hand. That which breaks in the operation is called *shorts*, and is about half the value of the long hemp. The best water-retted hemp sells for about 8s. 6d. per stone; the other kind from one to two shillings lower.

Beating of hemp is the next operation, which formerly was performed entirely by hand, but now in most places by a water-mill, which raises three heavy beaters that fall upon it alternately; the hemp being turned all the while by a boy in order to receive the strokes equally. The finer it is required to make

the tow, the more beating is necessary. It is then dressed or combed by drawing it through heckles formed like the combs of wool-mannufacturers, only fixed. Sometimes it is divided into two or three sorts of tow, and sometimes the whole is worked together into one sort; the prices varying from 6d. to 1s. 6d. per pound.

The hemp thus manufactured is sold to spinners, who reel their yarn as follows:

2 Yards make	-	1 thread.
40 Threads	-	1 lea.
20 Leas	-	1 skain.
3 Skains	-	1 clue of 4800 yards.

It is next delivered to the bleachers, who return it bleached on receiving 20 or 21 clues for every 120 bleached. The prices of the hemp-yarn are as follows:

1 Clue from a pound	-	7d. or 6½d.
1½ from do.	-	8½d. or 8d.
2 from do.	-	9½d. or 9d.
2½ from do.	-	10½d. or 10d.
3 from do.	-	12d.

Chinese HEMP, a newly discovered species of *Cannabis*, of which an account is given in the 72d volume of the Philosophical Transactions, p. 46. In that paper Mr. Fitzgerald, vice-president of the society for encouraging arts, mentions his having received the seeds from the late Mr. Elliot; which being sown, according to his directions, produced plants 14 feet high, and nearly seven inches in circumference. These being pulled up in November, and steeped for a fortnight in water, were placed against a southern wall to dry. After this the hemp was found to separate easily from the woody part; and so great was the produce, that 32 plants yielded three pounds and a quarter. In consequence of this success, Mr. Fitzgerald applied to the directors of the India company to procure some of the seeds from China; which being complied with, the society were furnished, in 1785, with some more of the seeds, which were distributed to several of the members; but, notwithstanding their endeavours, few of the plants appear to have ripened their seeds in this country. Two of the species of hemp, tried by the duke of Northumberland, rose to the height of 14 feet seven inches, and would have been much larger, had they not been hurt by an high wind: another kind arose only to that of three feet and an half, the stem about the size of a common wheat straw; but though it flowered well, did not produce any seed. These kinds were sown in an hot-bed, where the heat was very strong, on the 14th of April. They appeared above ground in four days, and were transplanted into pots on the 25th. They were then put under an hot-bed frame where the heat had been gone off, to harden them for the natural ground, in which they were planted on the 30th, by turning them whole out of the pots; letting them, three together, be planted at two feet distance every way; covering them at times for about ten days, until they were supposed to be rooted. Only a few seeds were preserved from plants which had been kept constantly in a stove.

Other trials were attended with little better success; but, in 1786, the Rev. Dr. Hinton, of Northwold near Brandon, made a successful experiment with some seeds he received from the secretary of the society. They were sown on the 17th of May, and appeared on the 6th of June. The plants were few and sickly; and notwithstanding some fine showers, they continued to languish so much that the experiment was entirely abandoned, and buckwheat was harrowed into the ground for a fallow crop. In the beginning of October, however, the persons employed in cutting the buck-wheat discovered some seed in the heads of a few straggling hemp plants which had been suffered to grow in the crop; which being carefully threshed, afforded three pints of seed tolerably bright and heavy. These seeds were sown on

the 10th of May 1787. On the 19th they appeared above the ground numerous and healthy. The male hemp was drawn on the 13th of August, but the female not till the 9th of October; the spot on which the plants were sown measured only 322 square yards, and produced of marketable hemp no less than 95 stone 7 pounds 12 ounces; being upwards of one third more than the best crops of English hemp are ever known to produce. Thus it appeared, that the seeds of the Chinese hemp had retained their superiority over those of the English; though how long they would continue to do so cannot be determined but by experience. For this experiment Dr. Hinton received a silver medal from the society. Few of the seeds, either of Chinese, or any other hemp, will vegetate if two years old at the time of sowing; and to this circumstance the Doctor attributes the failure of other trials of Chinese hemp.

HEMP-*Agrimony*, a species of eupatorium. See EUPATORIUM.

HEMPSTED, or HENEL HEMPSTED, a town of Herts, with a market on Thursday; seated among the hills, on a branch of the river Coln, 18 miles S. W. of Hertford, and 23 N. W. of London. W. lon. 0. 15. N. lat. 51. 47.

HEMSKERCK (Egbert), called the *Old*, a celebrated Flemish painter of drolls and conversations, of whom, though so universally known, we have no information as to the time in which he flourished, or the school in which he was taught. Though the taste of his compositions is but low, yet it ought to be considered that he took his subjects from nature; from persons in the meanest occupations, whose dress, actions, and manners, could not furnish the imagination with any ideas of elegance: and to express their passions and undisguised humours, seems to have been the utmost of his ambition. By frequenting fairs, merry-meetings, gaming-houses, and inns, he acquired a surprising power of connecting humorous circumstances. He designed and drew correctly, and his pictures have a strong effect from his accurate management of the chiaro oscuro. Some of his pictures have suffered from unskilful cleaners, and many things are sold as his which dishonour him; but his genuine works, well preserved, have a clearness and force equal to any of the Flemish artists.

HEMSKERCK (Egbert), called the *Young*, was the disciple of Peter Grebber, but imitated the manner of Brouwer and of the elder Hemskerck. He was born at Haarlem in 1645, but settled at London, where for a long time his works were exceedingly esteemed, though they are now much sunk in their value. He had a whimsical imagination, and delighted in composing uncommon and fanciful subjects; such as the temptation of St. Anthony, nocturnal intercourses of witches and spectres, enchantments, &c. which he executed with a free pencil and a spirited touch. It was customary with him to introduce his own portrait among the conversations he designed; and for that purpose had a small looking-glass placed near his case. He died in 1704.

HEN, in ornithology. See PHASIANUS.

Guinea-HEN. See NUMIDA.

HEN-Bane. See HYOSCINUS.

HEN-Harrier. See FALCO.

HEN-Mould-soil, in agriculture, a term used by the husbandmen in Northamptonshire, and other counties, to express a black, hollow, spongy, and mouldering earth, usually found at the bottoms of hills. It is an earth much fitter for grazing than for corn, because it will never settle close enough to the grain to keep it sufficiently steady while it is growing up, without which, the farmers observe, it either does not grow well, or, if it seems to thrive, as it will in some years, the growth is rank, and yields much straw, but little ear. It is too moist, and to that is principally to be attributed this rankness of the crop in some years; and the occasion of its retaining so much moist-

ture is, that it usually has a bed of stiff clay, which will not let the water run off into the under strata. In some places they also give this name to a black, rich, and dense earth, with streaks of a whitish mould in many parts. This sort of hen-mould is usually found very rich and fertile.

HENAUT (Charles John Francis), was son of John Remi Henaut lord of Moutly, and born at Paris in 1685. He early discovered a sprightly benevolent disposition, and his penetration and aptness soon distinguished itself by the success of his studies. Claude de Lisle, father of the celebrated geographer, gave him the same lessons in geography and history which he had before given to the duke of Orleans, afterwards regent; and which have been printed in seven volumes, under the title of "Abridgment of Universal History." On quitting college, Henaut entered the Oratory, where he soon attached himself to the study of eloquence: and, on the death of the abbé René, reformer of La Trappe, he undertook to pronounce his panegyric; which not meeting the approbation of father Massillon, he quitted the Oratory after two years, and his father bought for him, of marechal Villeroy, the "lieutenance des chasses," and the government of Corbeil. At the marshal's he formed connections, and even intimate friendships, with many of the nobility, and passed the early part of his life in agreeable amusements, and in the liveliest company, without having his religious sentiments tainted. He associated with the wits till the dispute between Rousseau and de la Motte soon gave him a disgust for these trifling societies. In 1707 he gained the prize of eloquence at the French academy; and another next year at the academy des Jeux Floraux. About this time M. Reaumur, who was his relation, came to Paris, and took lessons in geometry under the same master, Guinée. Henaut introduced him to the abbé Bignon, and this was the first step of his illustrious course. In 1713 he brought a tragedy on the stage, under the disguised name of Fuselier. As he was known to the public only by some lighter pieces, "Cornelia the Vestal" met with no better success. He therefore locked it up without printing. In his old age his passion for these subjects reviving, and Mr. Horace Walpole being at Paris in 1768, and having formed a friendship with him as one of the most amiable men of his nation, obtained this piece, and had it printed at a press which he had at his country seat, from whence a beautiful edition of Lucan had before issued. In 1751 M. Henaut, under a borrowed name, brought out a second tragedy, intitled, "Marius," which was well received and printed. He had been admitted counsellor in parliament in 1706, with a dispensation on account of age; and in 1710 president of the first chamber of inquests. These important places, which he determined to fill in a becoming manner, engaged him in the most solid studies. The excellent work of M. Domat charmed him, and made him eager to go back to the fountain-head. He spent several years in making himself master of the Roman law, the ordinances of the French king, their customs, and public law. M. de Morville, procureur-general of the great council, being appointed ambassador to the Hague in 1718, engaged M. Henaut to accompany him. His personal merit soon introduced him to the acquaintance of the most eminent personages at that time there. The grand pensionary, Heinsius, who, under the exterior of Lacedemonian simplicity, kept up all the haughtiness of that people, lost with him all that hauteur which France itself had experienced from him in the negotiations of the treaty of Utrecht. The agitation which all France felt by Law's system, and the consequent sending of the parliament into exile, was a trial to the wise policy of the president Henaut. His friendship for the first president, De Mesmes, led him to second all the views of that great magistrate: he took part in all the negotiations, and was animated purely by the public good, without any private advantage. On the death of the cardinal du Bois, in 1723, he succeeded in his

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place at the French academy. Cardinal Fleury recommended him to succeed himself as director, and he pronounced the eulogy of M. de Malezieux.

History was M. Henaut's favourite study; not a bare collection of dates, but a knowledge of the laws and manners of nations; to obtain which he drew instructions from private conversations, a method he so strongly recommends in his preface. After having thus discussed the most important points of our public law, he undertook to collect and publish the result of his inquiries, and he is deservedly accounted the first framer of chronological abridgements; in which, without stopping at detached facts, he attends only to those which form a chain of events that perfect or alter the government and character of a nation, and traces only the springs which exalt or humble a nation, extending or contracting the space it occupies in the world. His work has had the fortune of those literary phenomena, where novelty and merit united excite minds eager after glory, and fire the ardour of young writers to press after a guide whom few can overtake. The first edition of the work, the result of 40 years reading, appeared in 1744, under the auspices of the chancellor Daguesseau, with the modest title of *an Essay*. The success it met with surprised him. He made continual improvements in it, and it has gone through nine editions, and been translated into Italian, English, and German, and even into Chinese. As the best writings are not secure from criticism, and are indeed the only ones that deserve it, the author read to the academy of Belles Lettres a defence of his abridgement. All the ages and events of the French monarchy being present to his mind, and his imagination and memory being a vast theatre whereon he beheld the different movements and parts of the actors in the several revolutions, he determined to give a specimen of what passed in his own mind, and to reduce into the form of a regular drama, one of the periods of French history, the reign of Francis II. which, though happy only by being short, appeared to him one of the most important by its consequences, and most easy to be confined within the stage bounds. His friend the chancellor highly approved the plan, and wished it to be printed. It accordingly went through five editions; the harmony of dates and facts is exactly observed in it, and the passions interested without offence to historic truth.

In 1755 he was chosen an honorary member of the academy of Belles Lettres, being then a member of the academies of Nanci, Berlin, and Stockholm. The queen appointed him superintendent of her house. His natural sprightliness relieved her from the serious attendance on his private morning lectures. The company of persons most distinguished by their wit and birth, a table more celebrated for the choice of the guests than its delicacies, the little comedies suggested by wit, and executed by reflection, united at his house all the pleasures of an agreeable and innocent life. All the members of this ingenious society contributed to render it agreeable, and the president was not behind any. He composed three comedies: *La Petite Maison*, *Le Jaloux de Soi-même*, and *Le Réveil d'Epiménide*. The subject of the last was the Cretan philosopher, who is pretended to have slept 27 years. He is introduced fancying that he had slept but one night, and astonished at the change in the age of all around him: he mistakes his mistress for his mother; but discovering his mistake, offers to marry her, which she refuses, though he still continues to love her. The queen was particularly pleased with this piece. She ordered the president to restore the philosopher's mistress to her former youth: he introduced Hebe, and this episode produced an agreeable entertainment. He was now in such favour with her majesty, that on the place of superintendent becoming vacant by the death of M. Bernard de Conbert master of requests, and the sum he had paid for it being lost to his family, Henaut solicited it in favour of several persons, till at last the queen bestowed it on himself, and con-

sented that he should divide the profits with his predecessor's widow. On the queen's death he held the same place under the dauphiness.

A delicate constitution made him liable to much illness; which, however, did not interrupt the serenity of his mind. He made several journeys to the waters of Plombières: in one of these he visited the deposed king Stanislaus at Luneville; and in another accompanied his friend the marquis de Pauliny, ambassador to Switzerland. In 1763 he drew near his end. One morning, after a quiet night, he felt an oppression, which the faculty pronounced a suffocating cough. His confessor being sent to him, he formed his resolution without alarm. He afterwards said, that he recollected having then said to himself, "What do I regret?" and called to mind that saying of Madame de Sevigné, "I leave here only dying creatures." He received the sacraments. It was believed the next night would be his last; but by noon next day he was out of danger. "Now (said he) I know what death is. It will not be new to me any more." He never forgot it during the following seven years of his life, which, like all the rest, were gentle and calm. Full of gratitude for the favours of Providence, resigned to its decrees, offering to the Author of his being a pure and sincere devotion; he felt his infirmities without complaining, and perceived a gradual decay with unabated firmness. He died Dec. 24, 1771, in his 86th year. He married in 1714 a daughter of M. le Bas de Montargis keeper of the royal treasure, &c. who died in 1728 without leaving any issue.

HENBURY, a village in Gloucestershire, near Bristol, two miles from St. Vincent's Rock. In this parish is a camp, with three rampires and trenches, supposed to have been British. In digging up this hill in 1707, great numbers of Roman coins were found.

HENDECAGON, in geometry, a figure that hath eleven sides and as many angles.

HENED-PENNY, in our old writers, a customary payment of money instead of hens at Christmas. It is mentioned in a charter of king Edward III. Mon. Angl. tom. ii. p. 327. Du Cange is of opinion it may be *ben-penny*, *gallinagium*, or a composition for eggs; but Cowel thinks it is misprinted *bened-penny* for *bowed-penny*, or *bead-penny*.

HENLEY, a town of Oxfordshire, with a market on Wednesday, Friday, and Saturday. It is seated on the Thames, over which is a handsome bridge, and sends malt, corn, &c. to London, by barges. It is 24 miles S. E. of Oxford, and 35 W. of London. W. lon. o. 46. N. lat. 51. 35.

HENLEY, a town in Warwickshire, with a market on Tuesday. It is seated on the river Alne, 10 miles N. W. of Warwick, and 102 W. N. W. of London. W. lon. o. 50. N. lat. 52. 23.

HENLEY (John), better known by the appellation of *Orator Henley*, a very singular character, was born at Melton-Moubray, Leicestershire, in 1691. His father, the Rev. Simon Henley, and his grandfather by his mother's side (John Dowel, M. A.), were both vicars of that parish. Having passed his exercises at Cambridge, and his examination for the degree of B. A. with the particular approbation of Mr. Field, Mr. Smales, and the master of the college, he returned to his native place, where he was first desired by the trustees of the school in Melton to assist in, and then to take the direction of that school; which he increased and raised from a declining to a flourishing condition. He established here a practice of improving elocution by the public speaking of passages in the classics, morning and afternoon, as well as orations, &c. Here he was invited by a letter from the Rev. Mr. Newcombe to be a candidate for a fellowship in St. John's; but as he had long been absent, and therefore lessened his personal interest, he declined appearing for it. Here likewise he began his "Universal Grammar," and finished

ten languages, with dissertations prefixed, as the most ready introduction to any tongue whatever. In the beginning of this interval he wrote his poem on "Esther," which was approved by the town, and well received. He was ordained a deacon by Dr. Wake, then bishop of Lincoln; and after having taken his degree of M. A. was admitted to priest's orders by Dr. Gibson, his successor in that see. He formed an early resolution to improve himself in all the advantages of books and conversation the most effectually, on the first opportunity, at London. But he laid the basis of future proficiency in assisting at the curacy of his native town; where he preached many occasional sermons, particularly one at the assizes of Leicester: he then gave a voluntary warning for the choice of a new master and curate, and came to town recommended by above 30 letters from the most considerable men in the country, both of the clergy and laity; but against the inclination of his neighbours and his school, which was now, as from his first entrance upon it, still advancing: and his method being established and approved, one of his own scholars was appointed to succeed him. In town he published several pieces, as a translation of Pliny's Epistles, of several works of Abbe Vertot, of Montfaucon's Italian Travels in folio, and many other lucubrations. His most generous patron was the earl of Macclesfield, who gave him a benefice in the country, the value of which to a resident would have been above 80l. a-year: he had likewise a lecture in the city; and preached more charity sermons about town, was more numerously followed, and raised more for the poor children, than any other preacher, however dignified or distinguished. But when he pressed his desire and promise from a great man of being fixed in town, it passed in the negative. He took the people (it seems) too much from their parish-churches; and as he was not so proper for a London divine, he was very welcome, notwithstanding all difficulties, to be a rural pastor. But it was not for a second rustication, as he informs us, that he left the fields and the swains of Arcadia to visit the great city: and as he knew it was as lawful to take a licence from the king and parliament at Hicks's-hall as at Doctors Commons (since the ministerial powers of this kingdom are and ought to be parliamentary only), he freely, without compulsion, or being desired or capable of being compelled to reside in the country, gave up his benefice and lecture, certainties for an uncertainty; believing the public would be a more hospitable protector of learning and science, than some of the upper world in his own order.

Mr. Henley, in answer to a cavil (that he borrowed from books), proposed, "that if any person would single out any celebrated discourse of an approved writer, dead or living, and point out what he thought excellent in it, and the reasons; he would submit it to the world, whether the most famed composition might not be surpassed in their own excellency, either on that or any different subject."

Henley preached on Sundays upon theological matters, and on Wednesdays upon all other sciences. He declaimed some years against the greatest persons, and occasionally, says Warburton, did Pope that honour. The poet in return thus blazons him to infamy:

"But, where each science lifts its modern type,
"History her pot, Divinity his pipe,
"While proud Philosophy repines to show,
"Dishonest fight! his breeches rent below;
"Imbrow'd with native bronze, lo Henley stands,
"Tuning his voice, and balancing his hands.
"How fluent nonsense trickles from his tongue!
"How sweet the periods, neither said nor sung!
"Still break the benches, Henley! with thy strain,
"While Kennet, Hare, and Gibson preach in vain.

"O great restorer of the good old stage,
 "Preacher at once and Zany of thy age!
 "O worthy thou of Ægypt's wife abodes,
 "A decent priest where monkeys were the gods!
 "But Fate with butchers plac'd thy priestly stall,
 "Meek modern Faith to murder, hack and maul:
 "And bade thee live, to crown Britannia's praise,
 "In Toland's, Tindal's, and in Woolston's days."

This extraordinary person (who died October 14, 1756) struck medals, which he dispersed as tickets to his subscribers: a star rising to the meridian, with this motto, *Ad summam*; and below, *Inveniam viam, aut faciam*. Each auditor paid 1s. He was author of a weekly paper called the *Hyp Doctor*, for which he had 100l. a-year given him. Henley used every Saturday to print an advertisement in the *Daily Advertiser*, containing an account of the subjects he intended to discourse on the ensuing evening at his Oratory near Lincoln's-inn-fields, with a sort of motto before it, which was generally a sneer at some public transaction of the preceding week. Dr. Cobden, one of Geo. II.'s chaplains, having, in 1748, preached a sermon at St. James's from these words, "Take away the wicked from before the king, and his throne shall be established in righteousness;" it gave so much displeasure, that the Doctor was struck out of the list of chaplains; and the next Saturday the following parody of his text appeared as a motto to Henley's advertisement:

"Away with the wicked before the king,
 "And away with the wicked behind him;
 "His throne it will bless
 "With righteousness,
 "And we shall know where to find him."

His audience was generally composed of the lowest ranks; and it is well known that he even collected an infinite number of shoe makers, by announcing that he could teach them a speedy mode of operation in their business, which proved only to be, the making of shoes by cutting off the tops of ready-made boots.

HENNA, or **ALHENNA**. See **LAWSONIA**.

HENNEBERG, a county of Germany, in the circle of Franconia. It is bounded on the N. by Thuringia, on the W. by Hesse, on the S. by the bishopric of Wurtzburg, and on the E. by that of Bamberg. It abounds in mountains and woods, and is populous and fertile. It is divided among no less than seven different sovereigns. Mainungen is the capital.

HENNEBERG, a town of Germany, in the circle of Franconia, and county of the same name, with a castle. It is 34 miles N. W. of Bamberg. E. lon. 10. 38. N. lat. 50. 40.

HENNEBON, a town of France, in the department of Morbihan and late province of Bretagne, seated on the river Blavet, 260 miles W. by S. of Paris, and 22 N. W. of Vannes. W. lon. 3. 4. N. lat. 47. 50.

HENOTICUM, *HENOTICON*, q. d. "reconciliative;" of *ΕΝΩΤΗ* "I unite;" in church history, a famous edict of the emperor Zeno, published A. D. 482, and intended to reconcile and reunite the Eutychians with the Catholics. It was procured of the emperor by means of Acacius, patriarch of Constantinople, with the assistance of the friends of Peter Mongus and Peter Trullo. The sting of this edict lies here; that it repeats and confirms all that had been enacted in the councils of Nice, Constantinople, Ephesus, and Chalcedon, against the Arians, Nestorians, and Eutychians, without making any particular mention of the council of Chalcedon. It is in form of a letter, addressed by Zeno to the bishops, priests, monks, and people of Egypt and Libya. It was opposed by the Catholics, and condemned in form by pope Felix II.

HENRICHEMONT, a small town of France, in the de-

partment of Cher and late province of Berry, situated on the river Sandre. It was the capital of a district which Henry IV. gave to his illustrious minister the duke of Sully. Its original name was Bois-Belle; but Sully gave it the present name, in gratitude for the privileges which the king had annexed to it. As the soil in the environs is not excellent, the town is in a manner deserted; and the uniform houses, with which Sully had adorned it, are in a wretched condition. The family alienated it to Louis XV. in 1767. The town is 15 miles from Bourges.

HENRICIANS, in ecclesiastical history, a sect so called from Henry its founder, who, though a monk and hermit, undertook to reform the superstition and vices of the clergy. For this purpose he left Laufanne in Switzerland, and removing from different places, at length settled at Thoulouse in the year 1147, and there exercised his ministerial function, till being overcome by the opposition of Bernard abbot of Clairval, and condemned by pope Eugenius III. at a council assembled at Rheims, he was committed to a close prison in 1148, where he soon ended his days. This reformer rejected the baptism of infants; severely censured the corrupt manners of the clergy; treated the festivals and ceremonies of the church with the utmost contempt, and held clandestine assemblies for inculcating his peculiar doctrines.

HENRY (Cape), the S. cape of Virginia, at the entrance of Chesapeake Bay. W. lon. 76. 5. N. lat. 36. 56.

HENTINGS, in agriculture, a term used by the farmers for a particular method of sowing before the plough; the corn being cast in a straight line just where the plough is to come, is by this means presently ploughed in. By this way of sowing they think they save a great deal of seed and other charge, a dexterous boy being as capable of sowing this way out of his hat as the most skilful seedsmen. Henting is also a term used by the ploughmen, and others, to signify the two furrows that are turned from one another at the bottom, in the ploughing of a ridge. The word seems to be a corruption of ending, because those furrows made an end of ploughing the ridges. The tops of the ridges they call *verings*.

HEPAR SULPHURIS, *Alkaline*, or *Liver of Sulphur*; a combination of alkali and sulphur. See **CHEMISTRY**, p. 384. With the fume arising on the decomposition of hepar sulphuris by an acid, Mr. Bergman found a method of imitating the hot or sulphureous mineral waters, to as great perfection as the cold ones are now imitated by fixed air. The process consists simply in adding the vitriolic acid to hepar sulphuris, and impregnating water with the peculiar species of air that arises from this mixture; in the same manner as when water is impregnated with the fixed air arising from the mixture of that or any other acid with chalk. This *hepatic air*, as the author calls it, is very readily absorbed by water; to which it gives the smell, taste, and all the other sensible qualities of the sulphureous waters. A Swedish cantharus of distilled water, containing 12½ Swedish cubic inches, will absorb about 60 cubic inches of this hepatic air; and on dropping into it the nitrous acid, it will appear, that a real sulphur is contained, in a state of perfect solution, in this water, to the quantity of eight grains. It does not appear that any other acid, except what the author calls the *dephlogisticated marine acid*, will produce this effect. When any particular sulphureous water is to be imitated, we scarce need to observe, that the saline, or other contents peculiar to it, are to be added to the artificial hepatic water. Instead of the liver of sulphur, the operator may use a mixture of three parts of filings of iron and two parts of sulphur melted together.

It may, perhaps, be thought, that water thus prepared does not differ from that in which a portion of the hepar sulphuris has been dissolved: but it appears evidently to differ from it in this material circumstance; that in the solution of hepar sul-

phuris, the sulphur is held in solution by the water, through the means of the alkali combined with it: whereas, in Mr. Bergman's process, it does not appear probable that the hepatic sulphur rises substantially in the form of air; for, in that case, its presence in the hepatic water might be detected by means of the weakest of the acids (even the nephritic), which would precipitate the sulphur from it. Nor can it be supposed that any portion or constituent part of the alkali itself (except a part of its remaining fixed air) can come over. The water, therefore, must owe its impregnation to the sulphur, raised, in some peculiar manner, into the state of an elastic vapour; permanent, when the experiment is made in quicksilver; but condensable in water, and rendered soluble in that fluid through the means of some unknown principle combined with it, and which the author supposes to be the matter of heat combined with it through the medium of phlogiston.

HEPATIC, in medicine and anatomy, any thing belonging to the liver.

HEPATIC Air, a permanently elastic fluid, of a very disagreeable odour somewhat like that of rotten eggs, obtained in plenty from combinations of sulphur with earths, alkalies, metals, &c. and sometimes from combinations of alkalies with substances which do not appear to contain any sulphur. The nature of this fluid has been particularly examined by Mr. Kirwan, of whose experiments we have an account in the 76th volume of the Philosophical Transactions.

From considering the results, that gentleman concludes, that hepatic air consists merely of sulphur rarefied by elementary fire, or the matter of heat. Some have supposed that it consists of liver of sulphur itself volatilized; but this our author denies, for the following reasons: 1. It is evidently, though weakly, acid; reddening litmus, and precipitating acetous baro-felinite, though none of the other solutions of earths do. 2. It may be extracted from materials which either contain no alkali at all, or next to none; as iron, sugar, oil, charcoal, &c. 3. It is not decomposed by marine or fixed air; by which nevertheless liver of sulphur may be decomposed.

Our author informs us, that he was formerly of opinion that sulphur was held in solution in hepatic air, either by means of vitriolic or marine air: but neither of these is essential to the constitution of hepatic air as such, since it is producible from materials that contain neither of these acids; and from whatever substance it is obtained, it always affords the same character, viz. that of the vitriolic acid exceedingly weakened, such an acid as we may suppose sulphur itself to be. This substance indeed, even in its concrete state, manifests the properties of an acid, by uniting with alkalies, calcareous and ponderous earths, as well as with most metals, which a very weak acid might be supposed to do. See CHEMISTRY, p. 384 and 409.

HEPATIC Aloe, the inspissated juice of a species of ALOE.

HEPATIC Stone. See LIVER Stone.

HEPATIC Water. See HEPAR Sulphuris.

HEPATICA, in botany, a species of ANEMONE.

HEPATITIS, in medicine, an inflammation of the liver. See MEDICINE.

HEPATOSCOPIA, formed of *ήπαρ* liver, and *σκοπεω* I consider, in antiquity, a species of divination, wherein predictions were made by inspecting the livers of animals. Hepatoscopia is also used as a general name for divination by entrails.

HEPHÆSTIA, in Grecian antiquity, an Athenian festival in honour of Vulcan, the chief ceremony of which was a race with torches. It was performed in this manner: The antagonists were three young men, one of whom, by lot, took a lighted torch in his hand, and began his course; if the torch was extinguished before he finished the race, he delivered it to the second; and he in like manner to the third: the victory was his

who first carried the torch lighted to the end of the race; and to this successive delivering of the torch we find many allusions in ancient writers.

HEPHTHEMIMERIS, composed of *ἑπτα* seven, *ήμισυ* half, and *μετρ* part, in the Greek and Latin poetry, a sort of verse consisting of three feet and a syllable; that is, of seven half feet.

Such are most of the verses in Anacreon:

Θ:λω	γελειν	Ατρ:ι	δας
Θελω	δε Καδ	μιν α	διν, &c.

And that of Aristophanes, in his Plutus: *ἑπτε μετρ: χορη.* They are also called *trimetri cataclitici*.

HEPIIthemimeris, or *Hepththemimeres*, is also a caesura after the third foot; that is, on the seventh half-foot. It is a rule, that this syllable, though it be short in itself, must be made long on account of the caesura, or to make it an *hephtthemimeris*. As in that verse of Virgil—*Et furis agilitus amor, et conscia virtus*. It may be added, that the caesura is not to be on the fifth foot, as it is in the verse which Dr. Harris gives us for an example: *Ille latus nuceum molli fultus Hyacintho*. This is not a hephthemimeris caesura, but a henneamimeris, i. e. of nine half feet.

HEPTACHORD, in the ancient poetry, signified verses that were sung or played on seven chords, that is, on seven different notes. In this sense it was applied to the lyre when it had but seven strings. One of the intervals is also called an *heptachord*, as containing the same number of degrees between the extremes.

HEPTAGON, in geometry, a figure consisting of seven sides, and as many angles. In fortification, a place is termed an *heptagon*, that has seven bastions for its defence.

HEPTAGONAL NUMBERS, in arithmetic, a sort of polygonal numbers, wherein the difference of the terms of the corresponding arithmetical progression is 5. One of the properties of these numbers is, that if they be multiplied by 40, and 9 be added to the product, the sum will be a square number.

HEPTANDRIA, in botany, from *ἑπτα* seven, and *ανδρ* a man; the seventh class in Linnæus's sexual method, consisting of plants with hermaphrodite flowers, which have seven stamina or male-organs. The orders are four, derived from the number of styles or female organs. See BOTANY, p. 40.

HEPTANGULAR, in geometry, an appellation given to figures which have seven angles.

HEPTARCHY, compounded of the Greek *ἑπτα* "seven," and *αρχη*, *imperium*, "government," a government composed of seven persons, or a country governed by seven persons, or divided into seven kingdoms. The Saxon heptarchy included all England, which was cantoned out into seven petty independent kingdoms, peopled and governed by different clans and colonies; viz. those of Kent, the South Saxons, West Saxons, East Saxons, Northumberland, the East Angles, and Mercia. The heptarchy was formed by degrees from the year 455, when first the kingdom of Kent was erected, and Hengist assumed the title of king of Kent immediately after the battle of Eglesford; and it terminated in 827 or 828, when king Egbert reunited them into one, made the heptarchy into a monarchy, and assumed the title of king of England. It must be observed, however, that though Egbert became monarch of England, he was not perfectly absolute. The kingdom which he actually possessed consisted of the ancient kingdoms of Wessex, Susses, Kent, and Essex, that had been peopled by Saxons and Jutes. As for the other three kingdoms, whose inhabitants were Angles, he contented himself with preserving the sovereignty over them, permitting them to be governed by kings, who were his vassals and tributaries. The government of the heptarchy, reckoning from the founding of the kingdom of Mercia, the last of the

seven Anglo-Saxon kingdoms, lasted 243 years; but if the time spent by the Saxons in their conquests from the arrival of Hengist in 449 be added, the heptarchy will be found to have lasted 378 years from its commencement to its dissolution. The causes of the dissolution of the heptarchy were, the great inequality among the seven kingdoms, three of which greatly surpassed the others in extent and power; the default of male heirs in the royal families of all the kingdoms, that of Wessex excepted; and the concurrence of various circumstances which combined in the time of Egbert.

HERACLEA, an ancient seaport of Turkey in Europe, in Rumania, with a Greek archbishop's see. It was formerly very famous; and there are still considerable remains of antiquity. It is 50 miles W. of Constantinople. E. lon. 27. 58. N. lat. 40. 59.

HERACLEONITES, a sect of Christians, the followers of Heracleon, who refined upon the Gnostic divinity, and maintained that the world was not the immediate production of the Son of God, but that he was only the occasional cause of its being created by the demiurgus. The Heracleonites denied the authority of the prophecies of the Old Testament, maintaining that they were mere random sounds in the air; and that St. John the Baptist was the only true voice that directed to the Messiah.

HERACLEUM, *MADNESS*; a genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order, *Umbellatæ*. The fruit is elliptical, emarginated, compressed, and striated, with a thin border. The corolla is difform, inflexed, and emarginated; the involucre dropping off. There are five species, of which the most remarkable is the spondylium, or cow-parsnip. This is common in many parts of Britain, and other northern parts of Europe and Asia. Gmelin, in his *Flora Siberica*, p. 214. tells us, that the inhabitants of Kamtschatka, about the beginning of July, collect the foot-stalks of the radical leaves of this plant, and, after peeling off the rind, dry them separately in the sun, and then, tying them in bundles, dry them carefully in the shade: in a short time afterwards, these dried stalks are covered over with a yellow saccharine efflorescence, tasting like liquorice: and in this state they are eaten as a great delicacy. The Russians not only eat the stalks thus prepared, but procure from them a very intoxicating spirit. They first ferment them in water with the greater bilberries (*vaccinium uliginosum*), and then distil the liquor to what degree of strength they please; which Gmelin says is more agreeable to the taste than spirits made from corn. This may therefore prove a good succedaneum for whisky, and prevent the consumption of much barley, which ought to be applied to better purposes. Swine and rabbits are very fond of this plant. In the county of Norfolk it is called *bog-weed*.

HERACLIDÆ, the descendants of Hercules, greatly celebrated in ancient history. Hercules, at his death, left to his son Hyllus all the rights and demands which he had upon the Peloponnesus, and permitted him to marry Iole as soon as he came of age. The posterity of Hercules were not more kindly treated by Euristheus than their father had been, and they were obliged to retire for protection to the court of Ceyx, king of Trachinia. Euristheus pursued them thither; and Ceyx, afraid of his resentment, begged the Heraclidæ to depart from his dominions. From Trachinia they came to Athens, where Theseus the king of the country, who had accompanied their father in some of his expeditions, received them with great humanity, and assisted them against their common enemy Euristheus. Euristheus was killed by the hand of Hyllus himself, and his children perished with him, and all the cities of the Peloponnesus became the undisputed property of the Heraclidæ. Their triumph, however, was short; their numbers were lessened by

a pestilence; and the oracle informed them, that they had taken possession of the Peloponnesus before the gods permitted their return. Upon this they abandoned Peloponnesus, and came to settle in the territories of the Athenians, where Hyllus, obedient to his father's commands, married Iole the daughter of Eurystus. Soon after he consulted the oracle, anxious to recover the Peloponnesus; and the ambiguity of the answer determined him to make a second attempt. He challenged to single combat Atreus, the successor of Euristheus on the throne of Mycenæ; and it was mutually agreed that the undisturbed possession of the Peloponnesus should be ceded to whosoever defeated his adversary. Echemus accepted the challenge for Atreus, and Hyllus was killed, and the Heraclidæ a second time departed from Peloponnesus. Cleodæus the son of Hyllus made a third attempt, and was equally unsuccessful; and his son Aristomachus some time after met with the same unfavourable reception, and perished in the field of battle. Aristodemus, Temenus, and Chresphontes, the three sons of Aristomachus, encouraged by the more expressive word of an oracle, and desirous to revenge the death of their progenitors, assembled a numerous force, and with a fleet invaded all Peloponnesus. Their expedition was attended with much success; and after some decisive battles, they became masters of all the peninsula. The recovery of the Peloponnesus by the descendants of Hercules forms an interesting epoch in ancient history, which is universally believed to have happened 80 years after the Trojan war, or 1190 years before the Christian era. This conquest was totally achieved about 120 years after the first attempt of Hyllus, who was killed about 20 years before the Trojan war. As it occasioned a world of changes and revolutions in the affairs of Greece, inasmuch that scarce a state or people but were turned upside down thereby, the return of the Heraclidæ is the epocha of the beginning of profane history: all the time that preceded it is reputed fabulous. Accordingly, Ephorus, Cumanus, Calisthenes, and Theopompus, only begin their histories from hence.

HERACLIDES of PONTUS, a Greek philosopher, the disciple of Speusippus, and afterwards of Aristotle, flourished about 326 B. C. His vanity prompted him to desire one of his friends to put a serpent into his bed just as he was dead, in order to raise a belief that he was ascended to the heavens among the Gods; but the cheat was discovered. All his works are lost.

HERACLITUS, a famous Ephesian philosopher, who flourished about the 69th Olympiad, in the time of Darius Hystaspes. He is said to have continually bewailed the wicked lives of men, and, as often as he came among them, to have fallen a-weeping; contrary to Democritus, who made the follies of mankind a subject of laughter. He retired to the temple of Diana, and played at dice with the boys there; saying to the Ephesians who gathered round him, "Worst of men, what do ye wonder at? Is it not better to do thus than to govern you?" Darius wrote to this philosopher to come and live with him; but he refused the offer: at last, out of hatred to mankind, he retired to the mountains, where he contracted a dropsy by living on herbs, which destroyed him at 70 years of age. His writings gained him to great reputation, that his followers were called *Heraclitians*. Laertius speaks of a treatise upon nature, divided into three books, one concerning the universe, the second political, the third theological. This book he deposited in the temple of Diana; and it is said, that he affected to write obscurely, lest it should be read by the vulgar, and become contemptible. The fundamental doctrine of his philosophy was, that fire is the principle of all things; and the ancient philosophers have collected and preserved admirable apophthegms of this philosopher.

HERALD, says Vertegau, is derived from the Saxon word *Herehault*, and by abbreviation *Heraht*, which in that language

signifies the champion of an army; and, growing to be a name of office, it was given to him who, in the army, had the special charge to denounce war, to challenge to battle and combat, to proclaim peace, and to execute martial messages. But the business of heralds with us is as follows, viz. To marshal, order, and conduct all royal cavalcades, ceremonies at coronations, royal marriages, installations, creations of dukes, marquises, earls, viscounts, barons, baronets, and dubbing of knights; embalmings, funeral processions, declarations of war, proclamations of peace, &c.: to record and blazon the arms of the nobility and gentry; and to regulate any abuses therein through the English dominions, under the authority of the Earl Marshal, to whom they are subservient. The office of Windsor, Chester, Richmond, Somerset, York, and Lancaster heralds, is to be assistants to the kings at arms, in the different branches of their office; and they are superior to each other, according to creation, in the above order.

Heralds were formerly held in much greater esteem than they

are at present; and were created and christened by the king, who, pouring a gold-cup of wine on their head, gave them the herald-name: but they are now made by the Earl Marshal. They could not then arrive at the dignity of herald without having been seven years purpivant; nor could they quit the office of herald, but to be made king at arms. Richard III. was the first who formed them, in this kingdom, into a college; and afterwards great privileges were granted them by Edward VI. and Philip and Mary.

The origin of heralds is very ancient. Stentor is represented by Homer as herald of the Greeks, who had a voice louder than 50 men together. The Greeks called them *κρητις*, and *εἰρηνοδολαυες*; and the Romans, *feciales*. The Romans had a college of heralds, appointed to decide whether a war were just or unjust; and to prevent its coming to open hostilities, till all means had been attempted for deciding the difference in a pacific way.

H E R A L D R Y,

A SCIENCE which teaches how to blazon, or explain in proper terms, all that belongs to coats-of-arms: and how to marshal, or dispose regularly, divers arms on a field. It also teaches whatever relates to the marshalling of solemn cavalcades, processions, and other public ceremonies at coronations, installations, creations of peers, nuptials, christening of princes, funerals, &c.

Arms, or coats-of-arms, are hereditary marks of honour, made up of fixed and determined colours and figures, granted by sovereign princes, as a reward for military valour, or some signal public service performed. These are intended to denote the descent and alliance of the bearer, or to distinguish states, cities, societies, &c. civil, ecclesiastical, and military.

Although arms appear thus to be the proper object of the science of Heraldry, yet they differ much both in their origin and antiquity. Heraldry, according to Sir George Mackenzie, "as digested into an art, and subjected to rules, must be ascribed to Charlemagne and Frederick Barbarossa, for it did begin and grow with the feudal law." Sir John Ferne is of opinion, that we did borrow *arms* from the Egyptians; meaning, from their hieroglyphics. Sir William Dugdale mentions, that arms, as marks of honour, were first used by great commanders in war, necessity requiring that their persons should be notified to their friends and followers. The learned Alexander Nisbet, in his excellent System of Heraldry, says, that arms owe their rise and beginning to the light of nature, and that signs and marks of honour were made use of in the first ages of the world, and by all nations, however simple and illiterate, to distinguish the noble from the ignoble. We find in Homer, Virgil, and Ovid, that their heroes had divers figures on their shields, whereby their persons were distinctly known. Alexander the Great, desirous to honour those of his captains and soldiers who had done any glorious action, and also to excite an emulation among the rest, did grant them certain badges to be borne on their armour, pennons, and banners; ordering, at the same time, that no person or potentate, through his empire, should attempt or presume to give or tolerate the bearing of those signs upon the armour of any man, but it should be a power reserved to himself; which prerogative has been claimed ever since by all other kings and sovereign princes within their dominions.

After these and many other different opinions, all that can be said with any certainty is, that, in all ages, men have made

use of figures of living creatures, or symbolical signs, to denote the bravery and courage either of their chief or nation, to render themselves the more terrible to their enemies, and even to distinguish themselves or families, as names do individuals. The famous C. Agrippa, in his treatise of the vanity of sciences, cap. 81. has collected many instances of these marks of distinction, anciently borne by kingdoms and states that were any way civilized. Thus, the Egyptians bore an Ox; the Athenians, an Owl; the Goths, a Bear; the Romans, an Eagle; the Franks, a Lion; and the Saxons, a Horse. The last is still borne in the arms of his present Britannic Majesty. As to hereditary arms of families, William Cambden, Sir Henry Spelman, and other judicious heralds, agree, that they began no sooner than towards the latter end of the 11th century. According to Father Menestrier's opinion, a French writer, whose authority is of great weight in this matter, Henry l'Oiseleur (the falconer), who was raised to the imperial throne of the West in 920, by regulating tournaments in Germany gave occasion to the establishment of family-arms, or hereditary marks of honour, which undeniably are more ancient and better observed among the Germans than in any other nation. Moreover, this last author asserts, that with tournaments first came up coats-of-arms; which were a sort of livery, made up of several lists, fillets, or narrow pieces of stuff of many colours, from whence came the fess, the bend, the pale, &c. which were the original charges of family-arms; for they who never had been at tournaments, had not such marks of distinction. They who enlisted themselves in the Croisades, took up also several new figures hitherto unknown in armorial ensigns; such as ale-rions, bezants, escalop-shells, martlets, &c. but more particularly crosses, of different colours for distinction's sake. From this it may be concluded, that heraldry, like most human inventions, was insensibly introduced and established; and that, after having been rude and unsettled for many ages, it was at last methodized, perfected, and fixed, by the Croisades and tournaments.

These marks of honour are called *arms*, from their being principally and first worn by military men at war and tournaments, who had them engraved, embossed or depicted on shields, targets, banners, or other martial instruments. They are also called *coats-of-arms*, from the custom of the ancients embroidering them on the coats they wore over their arms, as heralds do to this day.

Arms are distinguished by different names, to denote the causes of their bearing; such as, arms of Dominion;—of Pretension;—of Concession;—of Community;—of Patronage;—of Family;—of Alliance;—of Succession.

Arms of *Dominion*, or sovereignty, are those which emperors, kings, and sovereign states do constantly bear; being, as it were, annexed to the territories, kingdoms, and provinces they possess. Thus the three lions are the arms of England, the harp those of Ireland, &c.

Arms of *Pretension*, are those of such kingdoms, provinces, or territories, to which a prince or lord has some claim, and which he adds to his own, although the said kingdoms or territories be possessed by a foreign prince or other lord. Thus the kings of England have quartered the arms of France with their own ever since Edward III. laid claim to the kingdom of France, which happened in the year 1330, on account of his being son to Isabella, sister to Charles the Handsome, who died without issue.

Arms of *Concession*, or augmentation of honour, are either entire arms, or else one or more figures, given by princes as a reward for some extraordinary service. We read in history, that Robert Bruce, king of Scotland, allowed the earl of Winton's ancestor to bear, in his coat-armour, a crown supported by a sword, to show that he, and the clan Seaton, of which he was the head, supported his tottering crown. The late Queen Anne granted to Sir Cloudefley Shovel, rear-admiral of Great Britain, a chevron between two fleurs-de-lis in chief, and a crescent in base, to denote three great victories he had gained; two over the French, and one over the Turks.

Arms of *Community*, are those of bishoprics, cities, universities, academies, societies, companies, and other bodies corporate.

Arms of *Patronage*, are such as governors of provinces, lords of manors, patrons of benefices, &c. add to their family-arms, as a token of their superiority, rights, and jurisdiction. These arms have introduced into heraldry, castles, gates, wheels, ploughs, rakes, harrows, &c.

Arms of *Family*, or *paternal arms*, are those that belong to one particular family, that distinguish it from others, and which no person is suffered to assume without committing a crime, which sovereigns have a right to restrain and punish.

Arms of *Alliance*, are those which families, or private persons, take up and join to their own, to denote the alliances they have contracted by marriage. This sort of arms is either impaled, or borne in an *escutcheon of pretence*, by those who have married heiresses.

Arms of *Succession*, are such as are taken up by them who inherit certain estates, manors, &c. either by will, entail, or donation, and which they either impale or quarter with their own arms; which multiplies the titles of some families out of necessity, and not through ostentation, as many imagine.

These are the eight classes under which the different sorts of arms are generally ranged; but there is a sort which blazoners call *assumptive arms*, being such as are taken up by the caprice or fancy of upstarts, though of ever so mean extraction, who, being advanced to a degree of fortune, assume them without a legal title. This, indeed, is a great abuse of heraldry; and common only in Britain, for on the continent no such practice takes place.

We now proceed to consider the essential and integral parts of arms, which are these: 1. The *ESCUTCHEON*. 2. The *TINCTURES*. 3. The *CHARGES*. 4. The *ORNAMENTS*.

CH A P. I.

Of the SHIELD or ESCUTCHEON.

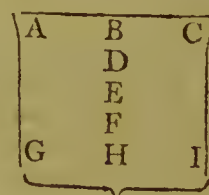
THE *Shield* or *Escutcheon* is the field or ground whereon are

represented the figures that make up a coat of arms: for these marks of distinction were put on bucklers or shields before they were placed on banners, standards, flags, and coat-armour; and wherever they may be fixed, they are still on a plane or superficies whose form resembles a shield.

Shields, in heraldry called *escutcheons* or *scutcheons*, from the Latin word *scutum*, have been, and still are, of different forms, according to different times and nations. Amongst ancient shields, some were almost like a horse-shoe, such as is represented by a few of the figures of *escutcheons*; others triangular, somewhat flat or rounded at the bottom. The people who inhabited Mesopotamia, now called *Diarbeck*, made use of this sort of shield, which it is thought they had of the Trojans. Sometimes the shield was heptagonal, that is, had seven sides. The first shield of this shape is said to have been used by the famous triumvir M. Antony. That of knights banneret was perfectly square, like a banner. As to modern *escutcheons*, those of the Italians, particularly of ecclesiastics, are generally a long oval. The English, French, Germans, and other nations, have their *escutcheons* formed different ways, according to the carver's or painter's fancy: of these, various examples are contained in our Plates of Heraldry. But the shield of maids, widows, and of such as are born ladies, and are married to private gentlemen, is of the form of a lozenge: See Plate 8. Sir George Mackenzie mentions one Muriel, countess of Strathern, who carried her arms in a lozenge, *anno* 1284, which shows how long we have been versant in heraldry.

Armorists distinguish several parts or points in *escutcheons*, in order to determine exactly the position of the bearings they are charged with; they are here denoted by the first nine letters of the alphabet, ranged in the following manner:

A B C the chief.
D the honour point.
E the fess point.
F the nombril point.
G H I the base.



The knowledge of these points is of great importance, and ought to be well observed, for they are frequently occupied with several things of different kinds. It is necessary to observe, that the dexter side of the *escutcheon* is opposite to the left hand, and the sinister side to the right hand of the person that looks on it.

CH A P. II.

Of TINCTURES, FURS, LINES, and DIFFERENCES.

SECT. I. Of Tinctures.

BY *Tinctures* is meant that variable hue of arms which is common both to shields and their bearings. According to the French heralds, there are but seven tinctures in armory; of which two are metals, the other five are colours, viz.

The Proper Colours.	By Tinctures for Commoners.	By Prec. Stones for Peers.	By Planets for Princes, Kings, and Emperors.
Yellow	Or	Topaz	Sol
White	Argent	Pearl	Luna
Red	Gules	Ruby	Mars
Blue	Azure	Sapphire	Jupiter
Purple	Purpure	Amethyst	Mercury
Black	Sable	Diamond	Saturn
Green	Vert	Emerald	Venus

When natural bodies, such as animals, plants, celestial bodies, &c. are introduced into coats of arms, they frequently retain their natural colours, which is expressed in this science by the word *proper*.

Besides the colours above mentioned, some of the English writers on heraldry have admitted two others, *viz.*

Orange, } termed { *Tenny*.
Blood-colour, } *Sanguine*.

But these two are rarely to be found in British bearings.

These tinctures are represented in engravings and drawings (the invention of the ingenious Silvester Petra Sancta, an Italian author of the last century) by dots and lines, as represented in Pl. 5.

Or is expressed by dots. *Argent* needs no mark, and is therefore plain. *Azure*, by horizontal lines. *Gules*, by perpendicular lines. *Vert*, by diagonal lines from the dexter chief to the sinister base points. *Purple*, by diagonal lines from the sinister chief to the dexter base points. *Sable*, by perpendicular and horizontal lines crossing each other.

Of the other two, *Tenny* is represented by diagonal lines from the sinister chief to the dexter base points, traversed by horizontal lines.

Sanguine is shewn by lines crossing each other diagonally from dexter to sinister, and from sinister to dexter.

The English heralds give different names to the roundle, according to its colour. See *Roundles* the Plate.

The French, and all other nations, do not apply such a multiplicity of names to this figure; but call them *Bezants*, after an ancient coin struck at Constantinople, once *Byzantium*, if they are *Or* and *Torteaux*; if of any other tincture, expressing the same.

SECT. II. Of Furs.

FURS represent the hairy skin of certain beasts prepared for the doublings or linings of robes and garments of state: and as shields were anciently covered with furred skins, they are therefore used in heraldry, not only for the linings of the mantles, and other ornaments of the shields, but also in the coats of arms themselves.

There are three different kinds in general use, *viz.*

1. *Ermine*; which is a field argent, powdered with black spots, their tails terminating in three hairs. See the Plate.

2. *Erminites*, where the field is sable, and the powdering white.

3. *Erminois*; the field is *Or*, the powdering *Sable*. For the use of this fur Guillim cites Bara, p. 14. but no such fur is to be found in Bara.

4. *Pean*; the field is *Sable*, the powdering *Or*. The French use no such term: but they call all furs or doublings *des pannes*, or *pennes*; which term has possibly given rise to this mistake, and many others, in those who do not understand the French language.

5. *Vair*, which is expressed by blue and white skins, cut into the forms of little bells, ranged in rows opposite to each other, the base of the white ones being always next to that of the blue ones. *Vair* is usually of six rows; if there be more or fewer, the number ought to be expressed; and if the colours are different from those above mentioned, they must likewise be expressed.

6. *Potent*, anciently called *Vairy-cuppy*, as when the field is filled with crutches or potents counter-placed.

Vair and *Potent* may consist of any two colours.

It may not be improper to observe, that the use of the tinctures took its rise from the several colours used by warriors whilst they were in the army, which S. de Petra Sancta proves by many citations. And because it was the custom to embroider gold and silver on silk, or silk on cloth of gold and silver,

the heralds did therefore appoint, that in imitation of the clothes so embroidered, colour should never be used upon colour, or metal upon metal.

SECT. III. Of the Lines used in the parting of Fields.

ESCUTCHEONS are either of one tincture, or more than one. Those that are of one only, that is, when some metal, colour, or fur, is spread all over the surface or field, such a tincture is said to be predominant: but in such as have on them more than one, as most have, the field is divided by lines; which, according to their different forms, receive various names.

Lines may be either straight or crooked. Straight lines are carried evenly through the escutcheon: and are of four different kinds; *viz.* a perpendicular line |; a horizontal, —; a diagonal dexter, \; a diagonal sinister, /.

Crooked lines are those which are carried unevenly through the escutcheon with rising and falling. French armorists reckon 11 different sorts of them; Guillim admits of seven only; but there are fourteen distinct kinds, the figures and names of which are as represented in the Plate. They are, 1. The *engrailed*. 2. The *invested*. 3. The *wavy*. 4. The *embattled*, or *crenelle*. 5. The *nebule*. 6. The *raguly*. 7. The *indented*. 8. The *dancette*. 9. The *dove-tail*. 10. The *embattled aronde*. 11. The *battled embattled*. 12. *Champaine*.

The principal reason why lines are thus used in heraldry, is to difference bearings which would be otherwise the same; for an escutcheon charged with a chief engrailed, differs from one charged with a chief wavy, as much as if the one bore a cross and the other a saltier.

As the fore-mentioned lines serve to divide the field, it must be observed, that if the division consists of two equal parts made by the perpendicular line, it is called *parted per pale*; by the horizontal line, *parted per fess*; by the diagonal dexter, *parted per bend*; by the diagonal sinister, *parted per bend sinister*; examples of which will be given in the sequel of this treatise.

If a field is divided into four equal parts by any of these lines, it is said to be *quartered*; which may be done two ways, *viz.*

Quartered or *parted per cross*; which is made by a perpendicular and horizontal line, which, crossing each other at the centre of the field, divide it into four equal parts called *quarters*. See Plate 7.

Quartered or *parted per saltier*; which is made by two diagonal lines, dexter and sinister, that cross one another in the centre of the field, and likewise divide it into four equal parts. *Ibid.*

The escutcheon is sometimes divided into a greater number of parts, in order to place in it the arms of the several families to which one is allied; and in this case it is called a *genealogical achievement*. These divisions may consist of 6, 8, 12, and 16, quarters [as the royal arms], and even sometimes of 20, 32, 64, and upwards; there being examples of such divisions frequently exhibited at pompous funerals. An extraordinary instance of this kind was exhibited at the pompous funeral of the late worthy viscountess Townshend, whose corpse was brought from Dublin castle in Ireland to Rainham-hall in Norfolk, one of the principal tenants on horseback carrying before the hearse a genealogical banner, containing the quarterings of his lordship's and her ladyship's family, to the amount of upwards of 160 coats. Sir George Booth, rector of the valuable living of Ash-ton under Line, bears six distinct coats of arms in his shield; *viz.* those for Booth, Barton, Venables, Mountfort, Ashton, Egerton; and has besides a right to 37 other coats: but Sir William Dugdale very justly objects to so many arms being clustered together in one shield or banner, on account of the difficulty of discerning and knowing asunder one coat of arms from another.

SECT. IV. Of the DIFFERENCES of Coats of Arms.

ARMORISTS have invented many differences or characteristic marks, whereby bearers of the same coat of arms are distinguished each from others, and their nearness to the principal bearer demonstrated. According to J. Guillim, these differences are to be considered either as ancient or modern.

1. Those he calls *ancient differences* consist in *bordures*; which is a bearing that goes all round, and parallel to the boundary of the escutcheon, in form of a hem, and always contains a fifth part of the field in breadth. Bordures were used in ancient times for the distinguishing not only of one nation or tribe from another, but also to note a diversity between particular persons descended of one family and from the same parents. This distinction, however, was not expressly signified by invariable marks; nor were bordures always appropriated to denote the different degrees of consanguinity: for, as Sir Henry Spelman observes in his *Aspillogia*, p. 140, ancient heralds, being fond of conspicuous differences, often inverted the paternal tincture, or sometimes inserted another charge in the escutcheon, such as bends, crosslets, cantons, or the like; which irregularity has, probably, induced modern armorists to invent and make use of others.

There are bordures of different forms and tinctures, as may be seen in the examples exhibited in Plate 5. Bordures are generally used as a *difference* between families of the same name, and likewise as marks of illegitimacy.

A bordure is never of metal upon metal, and seldom of colour upon colour, but rather of the tincture which the principal bearing or charge is of.

2. The *modern differences* which have been adopted not only for the distinguishing of sons issued out of one family, but also to denote the difference and subordinate degrees in each house from the original ancestors, are nine, *viz.* For the heir or first son, the Label. 2d son, the Crescent. 3d son, the Mullet. 4th son, the Martlet. 5th son, the Annulet. 6th son, the Flower-de-luce. 7th son, the Rose. 8th son, the Cross moline. 9th son, the Double Quater-foil. See Plate 5.

By these differences, the six sons of Thomas Beauchamp, the 15th earl of Warwick, who died in the 34th year of king Edward III. are distinguished in an old window of the church of St. Mary at Warwick; so that although they are called *modern differences*, their usage with the English is ancient.

It must be observed, that, of all the forementioned marks of distinction, none but the label is affixed on the coats of arms belonging to any of the royal family; which the introducers of this peculiarity have, however, thought proper to difference by additional pendants and distinct charges on them, as is shewn in the Plate, where

1. Prince of Wales and Duke of Cornwall has a Label Luna.
2. Duke of York—A Label Luna charged with a Cross Mars upon the middle Lambeaux.
3. Duke of Clarence—A Label Luna charged with a Cross Mars between two Anchors Jupiter.
4. Duke of Gloucester—A Label of 5 Points Luna, the middle one charged with a Fleur-de-lis Jupiter, the other four with a Cross Mars.

These differences are borne upon the Arms and Supporters.

As to the distinction to be made in the arms of the offspring belonging to each of the abovementioned brothers, it is expressed by figures on the top and margin of the TABLE of HOUSES given in the Plate. For instance, The heir or first son of the second house, beareth a crescent charged with a label during his father's life only. The second son of the second house, a crescent charged with another crescent. The third son of the second house, a crescent charged with a mullet. The fourth son of the second house, a crescent charged

with a martlet. The fifth son of the second house, a crescent charged with an annulet. The sixth son of the second house, a crescent charged with a flower-de-luce: and so on of the other sons, taking care to have them of a different tincture.

In what part of the escutcheon these differences should be borne is not certain; for Guillim, Morgan, and others, give us many different examples of their position. The honour-point would be the properest place, if the arms would admit of it; but that is not always the case, as that part may be charged with some figure in the paternal coat, which cannot with propriety receive the difference. There are instances where these are borne alone as perfect coats of arms.

In the *Examples of Differences* exhibited in Plate the 5th,
1. Is the mark of filiation for the fourth son of the sixth house.
2. Is the fourth son of the first generation; expressed by the martlet in chief.

Sisters, except of the blood-royal, have no other mark of difference in their coats of arms, but the form of the escutcheon (as observed before); therefore they are permitted to bear the arms of their father, even as the eldest son does after his father's decease. The reason of which is by Guillim said to be, that when they are married, they lose their surname, and receive that of their husbands.

Next to these diminutions, G. Leigh, J. Guillim, and after them Dr. Harris in his *Lexicon Technicum*, set forth at large various figures, which they pretend were formerly added to the coats of such as were to be punished and branded for cowardice, fornication, slander, adultery, treason, or murder, for which they give them the name of *abatements of honour*; but as they produce but one instance of such whimsical bearings, we have not inserted them here. Besides, arms being marks of honour, they cannot admit of any note of infamy; nor would any body now-a-days bear them if they were so branded. It is true, a man may be degraded for different crimes, particularly high treason; but in such cases the escutcheon is reversed, trod upon, and torn in pieces, to denote a total extinction and suppression of the honour and dignity of the person to whom it belonged.

CHAP. III.

Of the CHARGES.

WHATSOEVER is contained in the field, whether it occupy the whole or only a part thereof, is called a Charge. All charges are distinguished by the names of honourable ordinaries, sub-ordinaries, and common charges. *Honourable ordinaries*, the principal charges in heraldry, are made of lines only, which, according to their disposition and form, receive different names. *Sub-ordinaries* are ancient heraldic figures, frequently used in coats of arms, and which are distinguished by terms appropriated to each of them. *Common charges* are composed of natural, artificial, and even chimerical things; such as planets, creatures, vegetables, instruments, &c. See various instances in the Plates.

SECT. I. Of Honourable Ordinaries.

THE most judicious armorists admit only of nine honourable ordinaries, *viz.* The Chief—The Pale—The Bend—The Bend sinister—The Fess—The Bar—The Cheveron—The Cross—and The Saltier.

Of these, but six have diminutives, which are called as follows: That of the chief is a *fillet*; the pale has a *pallet* and *endorse*; the bend, a *bendlet*, *cost*, and *ribband*; the bend sinister has the *scarp* and *bûton*; the bar, the *closet* and *barulet*; the cheveron, a *cheveronel* and *couple-closet*. All which will be treated of in their order.

1. THE CHIEF is an ordinary determined by an horizontal

line, which, if it is of any other form but straight, must be expressed. It is placed in the upper part of the escutcheon, and containeth in depth the third part of the field. Its diminutive is a fillet, the content of which is not to exceed one fourth of the chief, and standeth in the lowest part thereof. This ordinary is subject to be charged with variety of figures; and may be indented, wavy, nebule, &c. Various examples are shewn in the Plates.

2. The PALE is an ordinary, consisting of two perpendicular lines drawn from the top to the base of the escutcheon, and contains the third middle part of the field. Its diminutives are, the pallet, which is the half of the pale; and the endorfe, which is the fourth part of a pale. This ordinary and the pallet may receive any charge, but the endorfe should not be charged. The endorfe, besides, is never used, according to J. Leigh, but to accompany the pale in pairs, as cotices do the bend; but Sir John Ferne is of a different opinion.

3. The BEND is an ordinary formed by two diagonal lines, drawn from the dexter-chief to the sinister-base; and contains the fifth part of the field in breadth, if uncharged; but if charged, then the third. Its diminutives are, the bendlet, which is the half of a bend; the cost or cotice, when two of them accompany a bend, which is the fourth part of a bend; and the ribband, the moiety of a cost, or the eighth part of the field.

There is also the *bend-sinister*, which is of the same breadth as the bend, but drawn the contrary way: this is subdivided into a scrape, which is the half of the bend, and into a bâton, which is the fourth part of the bend, but does not extend itself to the extremities of the field, there being part of it seen at both ends. See the example, in Plate 6.

4. The FESS is an ordinary which is produced by two parallel lines drawn horizontally across the centre of the field, and contains in breadth the third part thereof. Some English writers say it has no diminutive, for the bar is a distinct ordinary of itself.

5. The BAR, according to their definition, is formed of two lines, and contains but the fifth part of the field: which is not the only thing wherein it differs from the fess; for there may be more than one in an escutcheon, placed in different parts thereof, whereas the fess is limited to the centre-point; but in this the French differed from them. The bar has two diminutives; the barulet, which contains the half of the bar; and the clofet, which is the half of the barulet. When the shield contains a number of bars of metal and colour alternate, of even number, that is called *barry* of so many pieces, expressing their number. See the examples.

6. The CHEVERON, which represents two rafters of a house well jointed together, or a pair of compasses half open, takes up the fifth part of the field with the English, but the French gave it the third. Its diminutives are, The cheveronel, which contains the half of a cheveron; and the couple-clofet, which is the half of a cheveronel, that is, its breadth is but the fourth part of a cheveron. Leigh observes, that this last diminutive is never borne but in pairs, or with a cheveron between two of them. The French have but one diminution of this ordinary called *Etaye*, containing the third part of its breadth. Examples of cheverons are given in the Plates.

7. The CROSS is an ordinary formed by the meeting of two perpendicular with two horizontal lines in the fess-point, where they make four right-angles; the lines are not drawn throughout, but discontinued the breadth of the ordinary, which takes up only the fifth part of the field when not charged; but if charged, then the third. It is borne as well engrailed, indented, &c. as plain.

There is so great a variety of crosses used in heraldry, that it would be a very difficult task to treat of them all. Guillim has mentioned 39 different sorts; De la Columbiere, 72; Leigh,

46; and Upton declares he dares not ascertain all the various crosses borne in arms, for that they are almost innumerable: therefore, as all their forms cannot be expected here, we will only delineate such as are most commonly seen at present in coats-of-arms. See Plate 6.

8. The SALTIER, which is formed by the bend and bend-sinister crossing each other in right angles, as the intersecting of the pale and fess forms the cross, contains the fifth part of the field; but if charged, then the third. In Scotland, this ordinary is frequently called a *St. Andrew's cross*. It may, like the others, be borne engrailed, wavy, &c. as also between charges or charged with any thing. See Plate 6.

SECT. II. Of SUB-ORDINARIES.

BESIDES the honourable ordinaries and the diminutions already mentioned, there are other heraldic figures, called *sub-ordinaries*, or *ordinaries* only, which, by reason of their ancient use in arms, are of worthy bearing, viz. The *Giron*, *Franc-quarter*, *Canton*, *Pairle*, *Fret*, *Pile*, *Orle*, *Inescutcheon*, *Trefure*, *Annulet*, *Flanches*, *Flasques*, *Voiders*, *Billet*, *Lozenge*, *Gutté*, *Fusil*, *Rustre*, *Masle*, *Papillone*, and *Diaper*. For examples of the most material of these, see Plates 5 and 6.

The *Giron* is a triangular figure formed by two lines, one drawn diagonally from one of the four angles to the centre of the shield; and the other is drawn either horizontal or perpendicular, from one of the sides of the shield, meeting the other line at the centre of the field. *Girone* is said, when the field is covered with six, eight, ten, or twelve girones in a coat-of-arms: but a French author would have the true girone to consist of eight pieces only. This may be instanced in the coat-of-arms of Flora Campbell countess of Loudon, &c. whose ancestor was created baron of Loudon in 1604 by James VI. and earl of the same place, May 12, 1633, the 9th of Charles I.

The *Franc-quarter* is a square figure, which occupies the upper dexter quarter of the shield. It is but rarely carried as a charge. Silvester Petra Sancta has given us a few instances, however, of its use.

The *Canton* is a square part of the escutcheon, somewhat less than the quarter, but without any fixed proportion. It represents the banner that was given to ancient knights-bannerets, and, generally speaking, possesses the dexter-chief-point of the shield, as in the fig.; but should it possess the sinister-corner, which is but seldom, it must be blazoned a *canton-sinister*. Coats reckon it as one of the nine honourable ordinaries, contrary to most heralds' opinions. It is added to coats-of-arms of military men as an augmentation of honour.

The *Pairle* is a figure formed by the conjunction of the upper half of the saltier with the under half of the pale.

The *Fret* is a figure representing two little sticks in saltier, with a masle in the centre interlaced. J. Gibbon terms it the *herald's true lover's knot*; but many dissent from his opinion. *Fretty* is said when the field or bearings are covered with a fret of six, eight, or more pieces, as in the figure. The word *fretty* may be used without addition, when it is of eight pieces; but if there be less than that number, they must be specified.

The *Pile*, which consists of two lines, terminating in a point, is formed like a wedge, and is borne engrailed, wavy, &c. It issues in general from the chief, and extends towards the base; yet there are some piles borne in bend, and issuing from other parts of the field.

The *Orle* is an ordinary composed of two lines going round the shield, the same as the bordure, but its breadth is but one-half of the latter, and at some distance from the rim of the shield.

The *Inescutcheon* is a little escutcheon borne within the shield; which, according to Guillim's opinion, is only to be

so called when it is borne single in the fess-point or centre; but modern heralds, with more propriety, give the name of *inescocheon* to such as are contained in Plate 6, and call that which is fixed on the fess-point *escocheon of pretence*, which is to contain the arms of a wife that is an heiress, as represented in the same Plate.

The *Tressure* is an ordinary commonly supposed to be the half of the breadth of an orle, and is generally borne flowery and counter-flowery, as it is also very often *double*, and sometimes treble. See the Plate. This double tressure makes part of the arms of Scotland, as marshalled in the coat armour of the kings of Great Britain, and was granted to the Scots kings by Charlemagne, being then emperor and king of France, when he entered into a league with Achaius king of Scotland, to show that the French lilies should defend and guard the Scottish lion.

The *Annulet*, or ring, is a well-known figure, and is frequently to be found in arms through every kingdom in Europe. The annulet is shewn in the Table of Houses, Plate 5.

The *Flanches* are formed by two curved lines, or semicircles, being always borne double. G. Leigh observes, that on two such Flanches two sundry coats may be borne.

The *Flasques* resemble the flanches, except that the circular lines do not go so near the centre of the field; (see the figure.) J. Gibbon would have these two ordinaries to be both one, and written *flank*; alleging, that the two other names are but a corruption of this last: but as G. Leigh and J. Guillim make them two distinct and subordinate ordinaries, we have noticed them here as such.

The *Voiders* are by Guillim considered as a subordinate ordinary, and are not unlike the flasques (see the figure), but they occupy less of the field.

The *Billet* is an oblong square figure, twice as long as broad. Some heralds imagine, that they represent bricks for building; others more properly consider them as representing folded paper or letters.

The *Lozenge* is an ordinary of four equal and parallel sides, but not rectangular; two of its opposite angles being acute, and the other two obtuse. Its shape is the same with those of our window-glasses, before the square came so much in fashion. See the figure in Plate 5.

Gutté, or drops, are round at bottom, waved on the sides, and terminate at the top in points. Herald's have given them different names according to their different tinctures; thus, they are called, if Yellow, *Gutté d'Or*; if White, *d'Eau*; if Red, *de Sang*; Blue, *de Larmes*; Green, *de Vert*; and if Black, *de Poix*. See Plate 5.

The *Fusil* is longer than the lozenge, having its upper and lower part more acute and sharp than the other two collateral middle parts, which acuteness is occasioned by the short distance of the space between the two collateral angles; which space, if the fusil is rightly made, is always shorter than any of the four equal geometrical lines whereof it is composed. See the figure, in Plate 5.

The *Rustre* is a lozenge pierced round in the middle. They are called by the Germans *ruten*. Menestrier gives an example of them in the arms of Lebare in France, argent three rustres azure.

The *Masle* is pretty much like a lozenge, but voided or perforated through its whole extent, showing a narrow border, as in the figure. Authors are divided about its resemblance; some taking it for the mesh of a net, and others for the spots of certain flints found about Rohan. It is shewn in Plate 5.

Papillone is an expression used for a field or charge that is covered with figures like the scales of a fish. Monf. Baron gives as an example of it the arms of Monti Gueules Paplone

d'Argent. The proper term for it in English would be *escallop work*. See escallop in Plate 5.

Diapering is said of a field or charge shadowed with flourishings or foliage with a colour a little darker than that on which it is wrought. The Germans frequently use it; but it does not enter into the blazoning or description of an arms, but only serves to embellish the coat.

If the fore-mentioned ordinaries have any attributes, that is, if they are engrailed, indented, wavy, &c. they must be distinctly specified, after the same manner as the honourable ordinaries.

SECT. III. Of COMMON CHARGES borne in Coats-of-arms.

It has been already observed, that in all ages men have made use of the representation of living creatures, and other symbolical signs, to distinguish themselves in war; and that these marks, which were promiscuously used for hieroglyphics, emblems, and personal devices, gave the first notion of heraldry. But nothing shows the extent of human fancy more, than the great variety of these marks of distinction, since they are composed of all sorts of figures, some natural, others artificial, and many chimerical; in allusion, it is to be supposed, to the state, quality, or inclination of the bearer.

Hence it is, that the sun, moon, stars, comets, meteors, &c. have been introduced to denote glory, grandeur, power, &c. Lions, leopards, tigers, serpents, stags, &c. have been employed to signify courage, strength, prudence, swiftness, &c.

The application to certain exercises, such as war, hunting, music, &c. has furnished lances, swords, pikes, arms, fiddles, &c. Architecture, columns, cheverons, &c.; and the other arts several things that relate to them.

Human bodies, or distinct parts of them, also clothes, and ornaments, have, for some particular intention, found place in armory; trees, plants, fruits, and flowers, have likewise been admitted to denote the rarities, advantages, and singularities, of different countries.

The relation of some creatures, figures, &c. to particular names, has been likewise a very fruitful source of variety in arms. Thus the family of Coningsby bears three conies; of Arundel, six swallows; of Urson, a bear; of Lucic, three pikes; in Latin *tres lucios pisces*; of Starkey, a stork; of Castleman, a castle triple-towered; of Shuttleworth, three weaver's shuttles, &c.

Besides these natural and artificial figures, there are chimerical or imaginary ones used in heraldry, the result of fancy and caprice; such as centaurs, hydras, phenixes, griffons, dragons, &c. Which great variety of figures shows the impossibility of comprehending all common charges in a work of this nature; therefore such only shall be treated of as are most frequently borne in coats-of-arms.

1. Among the multitude of NATURAL FIGURES which are used in coats-of-arms, those most usually borne are, for the sake of brevity as well as perspicuity, distributed into the following classes, viz. *Celestial figures*; as, the sun, moon, stars, &c. and their parts. *Effigies* of men, women, &c. and their parts. *Beasts*; as, lions, stags, foxes, boars, &c. and their parts. *Birds*; as, eagles, swans, storks, pelicans, &c. and their parts. *Fishes*; as, dolphins, whales, sturgeons, trouts, &c. and their parts. *Reptiles and Insects*; as, tortoises, serpents, grasshoppers, &c. and their parts. *Vegetables*; as, trees, plants, flowers, herbs, &c. and their parts. *Stones*; as, diamonds, rubies, pebbles, rocks, &c.

These charges have, as well as ordinaries, divers attributes or epithets, which express their qualities, positions, and dispositions. Thus the sun is said to be *in his glory*, *eclipsed*, &c. The moon, *in her complement*, *increased*, &c. Animals are said

to be *rampant, passant, &c.* Birds have also their denominations, such as *close, displayed, &c.* Fishes are described to be *hauriant, naiant, &c.* Examples of these are contained in Plate 7. It is only therefore necessary to notice here, that lions are termed *lioncels* if more than two in the field, and eagles *eaglets*.

It must be observed also, that trees and plants are sometimes said to be *trunked, eradicated, fructuated, or raguled*, according as they are represented in arms.

2. Of ARTIFICIAL FIGURES borne in coats-of-arms, the following classes may be distinguished. See the Plate. *Warlike instruments*; as, swords, arrows, battering-rams, gauntlets, helmets, spears, pole-axes, &c. *Ornaments used in royal and religious ceremonies*; as, crowns, coronets, mitres, wreaths, croziers, &c. *Architecture*; as, towers, castles, arches, columns, plummets, battlements, churches, portcullisses, &c. *Navigation*; as, ships, anchors, rudders, pendants, sails, oars, masts, flags, galleys, lighters, &c.

All these bearings have different epithets, serving either to express their position, disposition, or make: *viz.* swords are said to be *erect, pommeled, hilted, &c.*; arrows, armed, feathered, &c.; towers, covered, embattled, &c.; and so on of all others, as will appear by the titles expressed in the Plate.

3. CHIMERICAL FIGURES form the last and oddest kind of bearings in coats of arms, as under the name of *chimerical*, heralds rank all figures of things which have no real existence, but are mere fabulous and fantastical inventions. These charges, griffons, martlets, and unicorns excepted, are so uncommon in British coats, that we have not thought it necessary to give more than a few examples of them; and these may be seen in Plate 7. Instances occur, however, of angels, cherubims, tritons, centaurs, martlets, griffons, unicorns, dragons, mermaids, satyrs, wiverns, harpies, cockatrices, phenixes, &c. and all these, like the foregoing charges, are subject to various positions and dispositions, which, from the principles already laid down, will be plainly understood.

To the forementioned figures may be added the *montegre*, an imaginary creature, supposed to have the body of a tiger with a satyr's head and horns; also those which have a real existence, but are said to be endowed with extravagant and imaginary qualities, *viz.* the salamander, beaver, camoleon, &c.

C H A P. IV.

Of the EXTERNAL ORNAMENTS of ESCUTCHEONS.

THE ornaments that accompany or surround escutcheons denote the birth, dignity, or office, of the person to whom the coat-of-arms appertaineth; and obtains both among the laity and clergy. Those most in use are of ten sorts, *viz.* crowns, coronets, mitres, helmets, mantles, chapeaux, wreaths, crests, scrolls, supporters.

SECT. I. *Of Crowns.*

THE first crowns were only diadems, bands, or fillets; afterwards they were composed of branches of divers trees, and then flowers were added to them. Among the Greeks, the crowns given to those who carried the prize at the Isthmian games, were of pine; at the Olympic, of laurel; and at the Nemean, of smillage. The Romans had various crowns to reward martial exploits and extraordinary services done to the republic; for which, see the article CROWN in this work, and Plate 8. Examples of some of these crowns are frequently met with in modern achievements.

Modern crowns are only used as an ornament, which emperors, kings, and independent princes set on their heads, in great solemnities, to denote their sovereign authority. These are described in heraldry as follows:

The imperial crown is made of a circle of gold, adorned with precious stones and pearls, heightened with fleurs-de-lis, bordered and seeded with pearls, raised in the form of a cap voided at the top, like a crescent. From the middle of this cap rises an arched fillet enriched with pearls, and surmounted of a mound, whereon is a cross of pearls.

The crown of the kings of Great Britain (see Plate 8.) is a circle of gold, bordered with ermine, enriched with pearls and precious stones, and heightened up with four crosses pattee and four large fleurs-de-lis alternately; from these rise four arched diadems adorned with pearls, which close under a mound, surmounted of a cross like those at bottom. Mr. Sandford, in his Genealogical History, p. 381, remarks, that Edward IV. is the first king of England that in his seal, or on his coin, is crowned with an arched diadem.

The crowns of Spain and Portugal are a ducal coronet, heightened up with eight arched diadems that support a mound, ensigned with a plain cross. Those of Denmark and Sweden are both of the same form; and consist of eight arched diadems, rising from a marquis's coronet, which conjoin at the top under a mound ensigned with a cross-botone. The crowns of most other kings in Europe are circles of gold, adorned with precious stones, and heightened up with large trefoils, and closed by four, six, or eight diadems, supporting a mound, surmounted of a cross.

The Great Turk bears over his arms a turban, enriched with pearls and diamonds, under two coronets, the first of which is made of pyramidal points heightened up with large pearls, and the uppermost is surmounted with crescents.

The Pope appropriates to himself a tiara or long cap of golden cloth, from which hang two pendants embroidered and fringed at the ends, *semée* of crosses of gold. This cap is inclosed by three marquis's coronets; and has on its top a mound of gold, whereon is a cross of the same, which cross is sometimes represented by engravers and painters pometted, recrossed, flowery, or plain. It is a difficult matter to ascertain the time when these haughty prelates assumed the three forementioned coronets. A patched up succession of the holy pontiffs, engraved and published a few years ago by order of Clement XIII. the late Pope, for the edification of his good subjects in Great Britain and Ireland, represents Marcellus, who was chosen bishop of Rome anno 310. and all his successors, adorned with such a cap: but it appears, from very good authority, that Boniface VIII. who was elected into the see of Rome anno 1295, first compassed his cap with a coronet; Benedict XII. in 1335, added a second to it; and John XXIII. in 1411, a third; with a view to indicate by them, that the Pope is the sovereign priest, the supreme judge, and the sole legislator among Christians.

SECT. II. *Of Coronets.*

THE Coronet of the prince of Wales, or eldest son of the king of Great Britain (pl. 8.), was anciently a circle of gold set round with four crosses-patee, and as many fleurs-de-lis alternately; but since the Restoration, it has been closed with one arch only, adorned with pearls, and surmounted of a mound and cross, and bordered with ermine like the king's. But besides the coronet, his royal highness has another distinguishing mark of honour, peculiar to himself, *viz.* a plume of three ostrich feathers, with an ancient coronet of a prince of Wales. Under it, in a scroll, is this motto, *Ich Dien*, which in the German or old Saxon language signifies "I serve." This device was at first taken by Edward prince of Wales, commonly called the *black prince*, after the famous battle of Cressy, in 1346, where having with his own hand killed John king of Bohemia, he took from his head such a plume, and put it on his own.

The coronet of all the immediate sons and brothers of the kings of Great Britain, is a circle of gold, bordered with ermine, heightened up with four fleurs-de-lis, and as many crosses-patee alternate (see Plate 8.). The particular and distinguishing form of such coronets as are appropriated to princes of the blood-royal, is described and settled in a grant of Charles II. the 13th of his reign.

The coronet of the *princesses* of Great Britain is a circle of gold, bordered with ermine, and heightened up with crosses-patee, fleurs-de-lis, and strawberry leaves alternate; whereas a prince's coronet has only fleurs-de-lis and crosses.

A *duke's* coronet is a circle of gold bordered with ermine, enriched with precious stones and pearls, and set round with eight large strawberry or parsley leaves.

A *marquis's* coronet is a circle of gold, bordered with ermine, set round with four strawberry leaves, and as many pearls on pyramidal points of equal height, alternate.

An *earl's* coronet is a circle of gold, bordered with ermine, heightened up with eight pyramidal points or rays, on the tops of which are as many large pearls, that are placed alternately with as many strawberry leaves, but the pearls much higher than the leaves.

A *viscount's* coronet differs from the preceding ones as being only a circle of gold bordered with ermine, with large pearls set close together on the rim, without any limited number, which is his prerogative above the baron, who is limited.

A *baron's* coronet, which, it appears, was granted by king Charles II. is formed with six pearls set at equal distances on a gold circle, bordered with ermine, four of which only are seen on engravings, paintings, &c. to show he is inferior to the viscount. In the Plate, where representations of the foregoing may be seen, we have given one of the caps worn by the ancient barons before the year 1661.

The eldest sons of peers, above the degree of a baron, bear their father's arms and supporters with a label, and use the coronet appertaining to their father's second title; and all the younger sons bear their arms with proper differences, but use no coronets.

As the crown of the king of Great Britain is not quite like that of other potentates, so do most of the coronets of foreign noblemen differ a little from those of the British nobility.

SECT. III. Of Mitres.

THE archbishops and bishops of England and Ireland place a mitre over their coats-of-arms. It is a round cap pointed and cleft at the top, from which hang two pendants fringed at both ends; with this difference, that the bishop's mitre is only surrounded with a fillet of gold, set with precious stones, whereas the archbishop's issues out of a ducal coronet. See Plate 8.

This ornament, with other ecclesiastical garments, is still worn by all the archbishops and bishops of the church of Rome, whenever they officiate with solemnity; but it is never used in England, otherwise than on coats-of-arms, as before mentioned.

The first archbishop's consecration in England was in the year 568. No mitre but an archbishop's is borne upon a ducal coronet, except the bishop of Durham, that see being a principality.

The first bishop's consecration in England was in the year 516.

SECT. IV. Of Helmets.

THE helmet was formerly worn as a defensive weapon, to cover the head; and is now placed over a coat-of-arms as its chief ornament, and the true mark of gentility. There are

several sorts, distinguished by the matter they are made of, by their form, and by their position. 1st, As to the matter they are, or rather were, made of: The helmets of sovereigns were of burnished gold damasked; those of princes and lords, of silver figured with gold; those of knights, of steel adorned with silver; and those of private gentlemen, of polished steel. 2dly, As to their form: Those of the king and the royal family, and noblemen of Great Britain, are open-faced and grated, and the number of bars serves to distinguish the bearer's quality; that is, the helmet appropriated to the dukes and marquises is different from the king's, by having a bar exactly in the middle, and two on each side, making but five bars in all; (see Plate 8.) whereas the king's helmet has six bars, viz. three on each side. The other grated helmet with four bars is common to all degrees of peerage under a marquis. The open-faced helmet without bars denotes baronets and knights. The close helmet is for all esquires and gentlemen. 3dly, Their position is also looked upon as a mark of distinction. The grated helmet in front belongs to sovereign princes. The grated helmet in profile is common to all degrees of peerage. The helmet standing direct without bars, and the beaver a little open, denotes baronets and knights. Lastly, the side-standing helmet, with the beaver close, is the way of wearing it amongst esquires and gentlemen. See the various figures in the Plate.

SECT. V. Of Mantlings.

MANTLINGS are pieces of drapery shaped in various ways, which serve to ornament escutcheons. They were the ancient coverings of helmets, to preserve them, or the wearer, from the injuries of the weather, as also to prevent the ill consequences of their too much dazzling the eye in action. But Guillim very judiciously observes, that their shape must have undergone a great alteration since they have been out of use, and therefore might more properly be termed *flourishings* than mantlings.

The French heralds assure us, that these mantlings were originally no other than short coverings which commanders wore over their helmets, and that, going into battle with them, they often, on their coming away, brought them back in a ragged manner, occasioned by the many cuts they had received on their heads: and therefore the more hacked they were, the more honourable they were accounted; as our colours in time of war are the more esteemed for having been shot through in many places.

Sometimes skins of beasts, as lions, bears, &c. were thus borne, to make the bearer look more terrible; and that gave occasion to the doubling of mantlings with furs.

SECT. VI. Of Chapeaux, Wreaths, and Crests.

A CHAPEAU is an ancient hat, or rather cap, of dignity worn by dukes, generally scarlet-coloured velvet on the outside, lined and turned up with fur; of late frequently to be met with above an helmet, instead of a wreath, under gentlemen's and noblemen's crests. Heretofore they were seldom to be found, as of right appertaining to prime families; but by the grants of Robert Cooke, Clarencieux, and other succeeding heralds, these, together with ducal coronets, are now frequently to be met with in families, who yet claim not above the degree of gentlemen. See the representations of the chapeau, &c. in plate 8.

THE WREATH is a kind of roll made of two skins of silk of different colours twisted together, which ancient knights wore as a head-dress when equipped for tournaments. The colours of the silk are always taken from the principal metal and colour contained in the coat-of-arms of the bearer. They are still accounted as one of the lesser ornaments of escutcheons, and are

placed between the helmet and the crest (see the Plate.). In the time of Henry I. and long after, no man who was under the degree of a knight had his crest set on a wreath; but this, like other prerogatives, has been infringed so far that every body now-a-days wears a wreath.

The **CREST** is the highest part of the ornaments of a coat-of-arms. It is called *crest*, from the Latin word *crisla*, which signifies comb or tuft, such as many birds have upon their heads, as the peacock, pheasant, &c. in allusion to the place on which it is fixed.

Crests were formerly great marks of honour, because they were only worn by heroes of great valour, or by such as were advanced to some superior military command, in order that they might be the better distinguished in an engagement, and thereby rally their men if dispersed; but they are at present considered as a mere ornament. The crest is frequently a part either of the supporters, or of the charge borne in the escutcheon. Thus the crest of the royal achievement of Great Britain is a "Lion guardant crown'd." There are several instances of crests that are relative to alliances, employments, or names; and which on that account have been changed.

SECT. VII. *Of the Scroll and Supporters.*

THE **SCROLL** is the ornament usually placed below the crest, containing a motto, or short sentence, alluding thereto, or to the bearings; or to the bearer's name, as in the two following instances. The motto of the noble earl of Chohnondeley is, *Cassis tutissima virtus*; i. e. "Virtue is the safest helmet;" on account of the helmet in the coat of arms. The motto of the right hon. lord Fortescue is, *Fortis scutum salus ducum*; i. e. "A strong shield is the safety of the commanders;" alluding to the name of that ancient family. Sometimes it has reference to neither, but expresses something divine or heroic; as that of the earl of Scarborough, which is, *Murus arcus conscientia sana*; i. e. "A good conscience is a wall of brass." Others are ænigmatical; as that of the royal achievement, which is *Dieu et mon droit*, i. e. "God and my right;" introduced by Edward III. in 1340, when he assumed the arms and title of *king of France*, and began to prosecute his claim, which occasioned long and bloody wars, fatal, by turns, to both kingdoms. Mottos, though hereditary in the families that first took them up, have been changed on some particular occasions, and others appropriated in their stead, instances of which are sometimes met with in the history of families.

SUPPORTERS are figures standing on the scroll, and placed at the side of the escutcheon; they are so called, because they seem to support or hold up the shield. The rise of supporters is, by F. Menestrier, traced up to ancient tournaments, wherein the knights caused their shields to be carried by servants or pages under the disguise of lions, bears, griffons, blackamoors, &c. who also held and guarded the escutcheons, which the knights were obliged to expose to public view for some time before the lists were opened. Sir George Mackenzie, who differs from this opinion, says, in his *Treatise on the Science of Heraldry*, chap. xxxi. p. 93. "That the first origin and use of them was from the custom which ever was, and is, of leading such as are invested with any great honour to the prince who confers it: thus, when any man is created a duke, marquis, or knight of the garter, or any other order, he is supported by, and led to the prince betwixt, two of the quality, and so receives from him the symbols of that honour; and in remembrance of that solemnity, his arms are thereafter supported by any two creatures he chooses." Supporters have formerly been taken from such animals or birds as are borne in the shields, and sometimes they have been chosen as bearing some allusion to the names of those whose arms they are made to support. The supporters of the arms of Great Britain, since king James

the first's accession to the throne, are a *Lion rampant guardant crowned Or, on the dexter-side*, and an *Unicorn Argent, crowned, armed, unguled, maned and gorged with an antique Crown, to which a chain is affixed, all Or, on the sinister*.

It is to be observed, that bearing coats-of-arms supported, is, according to the heraldic rules of England, the prerogative, 1st, Of those called *nobiles majores*, viz. dukes, marquises, earls, viscounts, and barons; 2d, Of all knights of the garter, though they should be under the degree of barons; 3d, Of knights of the Bath, who both receive on their creation a grant of supporters; and, lastly, of such knights as the king chooses to bestow this honour upon; as in the instance of Sir Andrew Fountain, who was knighted by Philip earl of Pembroke when lord-lieutenant of Ireland, Fountain being then his secretary; and on his return to England, king William granted him supporters to his arms, viz. *two Griffons Gules and Or*.

C H A P. V.

Of the Laws of HERALDRY, and the Method of Marballing Coats-of-arms.

THE several escutcheons, tinctures, charges, and ornaments of coats-of-arms, and their various properties, being now explained; it may not be improper to subjoin such rules for blazoning the same, as the ancient usage and laws of heraldry have established in Britain. 1. The first and most general rule is, to express heraldic distinctions in proper terms, so as not to omit any thing that ought to be specified, and at the same time to be clear and concise without tautology. 2. Begin with the tincture of the field, and then proceed to the principal charges which possess the most honourable place in the shield, such as Fess, Cheveron, &c. always naming that charge first which lies next and immediately upon the field. 3. After naming the tincture of the field, the honourable ordinaries, or other principal figures, you must specify their attributes, and afterwards their metal or colour. 4. When an honourable ordinary, or some one figure, is placed upon another, whether it be a Fess, Cheveron, Cross, &c. it is always to be named after the ordinary or figure over which it is placed, with one of these expressions, *surmount*, or *over all*. 5. In the blazoning of such ordinaries as are plain, the bare mention of them is sufficient; but if an ordinary should be made of any of the crooked lines mentioned above, its form must be specified; that is, whether it be Engrailed, Wavy, &c. 6. When a principal figure possesses the centre of the field, its position is not to be expressed (which amounts to the same thing) when a bearing is named, without specifying the point where it is placed, then it is understood to possess the middle of the shield. 7. The number of the points of mullets or stars must be specified when more than five; and also if a mullet or any other charge be pierced, it must be mentioned as such, to distinguish it from what is plain. 8. When a ray of the sun, or other single figure, is borne in any other part of the escutcheon than the centre, the point it issues from must be named. 9. The natural colour of trees, plants, fruits, birds, &c. is no otherwise to be expressed in blazoning but by the word *proper*; but if discoloured, that is, if they differ from their natural colour, it must be particularized. 10. When three figures are in a field, and their position is not mentioned in the blazoning, they are always understood to be placed two above, and one below. 11. When there are many figures of the same species borne in a coat-of-arms, their number must be observed as they stand, and must be distinctly expressed. See the plates of **CHARGES**.

There are positions called *irregular*; as for example, when three figures, which are naturally placed 2 and 1, are disposed 1 and 2, &c. It must also be observed, that when the field is

strewed with the same figures, this is expressed by the word *semé*: but, according to a French armorist's opinion, if the figures strewed on the field are whole ones, it must be denoted by the words *sans nombre*; whereas, if part of them is cut off at the extremities of the escutcheon, the word *semé* or *semi* is then to be used.

By MARSHALLING coats-of-arms, is to be understood the art of disposing divers of them in one escutcheon, and of distributing their contingent ornaments in proper places. Various causes may occasion arms to be thus conjoined, which J. Guillim comprises under two heads, viz. *manifest* and *obscure*. What this learned and judicious herald means by *manifest causes* in the marshalling of coats-of-arms, are such as betoken marriages, or a sovereign's gift, granted either through the special favour of the prince, or for some eminent services. Concerning marriages it is to be observed,

1. When the coats-of-arms of a married couple, descended of distinct families, are to be put together in one escutcheon, the field of their respective arms is conjoined Paleways, and blazoned *parted per Pale, Baron and Femme, two coats; first, &c.* In which case the baron's arms are always to be placed on the dexter-side, and the femme's arms on the sinister-side. See all the different examples of marshalling the wife's arms with those of the husband in pl. 8.

2. If a widower marry again, his late and present wife's arms are, according to G. Leigh, "to be both placed on the sinister-side, in the escutcheon with his own, and parted per Pale. The first wife's coat shall stand on the Chief, and the second on the Base; or he may set them both in Pale with his own, the first wife's coat next to himself, and his second outermost. If he should marry a third wife, then the two first matches shall stand on the Chief, and the third shall have the whole Base. And if he take a fourth wife, she must participate one half of the Base with the third wife, and so will they seem to be so many coats quartered." But it must be observed, that these forms of impaling are meant of hereditary coats, whereby the husband stands in expectation of having the hereditary possessions of his wife united to his patrimony. *Note.* If a man marry a widow, he marshalls her *maiden* arms only.

3. In the arms of femmes joined to the paternal coat of the baron, the proper differences by which they were borne by the fathers of such women must be inserted.

4. If a coat-of-arms that has a Bordure be impaled with another, as by marriage, then the Bordure must be wholly omitted in the side of the arms next the centre.

5. The person that marries an heiress, instead of impaling his arms with those of his wife, is to bear them in an escutcheon placed in the centre of his shield, which, on account of its showing forth his pretension to her estate, is called *an escutcheon of pretence*, and is blazoned *surmount*, i. e. *over-all*. But the children are to bear the hereditary coat-of-arms of their father and mother *quarterly*, which denotes a fixed inheritance, and so transmit them to posterity. The first and fourth quarters generally contain the father's arms, and the second and third the mother's; except the heirs should derive not only their estate, but also their title and dignity, from their mother.

6. If a maiden or dowager lady of quality marry a commoner, or a nobleman inferior to her rank, their coats of-arms may be set beside one another, in two separate escutcheons, upon one mantle or drapery, and the lady's arms ornamented according to her title. See pl. 5.

7. Archbishops and bishops impale their arms differently from the fore-mentioned coats, in giving the place of honour, that is, the dexter-side, to the arms of their dignity, as it is expressed in pl. 8, which represents the coats-of-arms of a supposed archbishop of Canterbury and bishop of an English See.

With respect to such armorial ensigns as the sovereign thinks

fit to augment a coat-of-arms with, they may be done in various ways, as may be seen in the arms of his Highness of Rutland, and many others.

So far the causes for marshalling divers arms in one shield, &c. are *manifest*. As to such as are called *obscure*, that is, when coats-of-arms are marshalled in such a manner that no probable reason can be given why they are so conjoined, the explanation of them must be left to the heralds.

CHAP. VI.

Of the ORDERS of KNIGHTHOOD, &c.

AS we have noticed at length, under the articles KNIGHTHOOD, BARONET, *Knights of the Garter*, BATH, &c. every thing necessary to be known on these subjects, we shall not here treat of them at any length. To the augmentations mentioned in the last chapter may be added, 1. The Baronet's mark of distinction, or the arms of the province of Ulster in Ireland, granted and made hereditary in the male line by king James I. who erected this dignity on the 22d of May 1611, in the 9th year of his reign, in order to propagate a plantation in the fore-mentioned province. This mark is *Argent, a sinister Hand couped at the Wrist, and erected Gules*; which may be borne either in a canton, or in an escutcheon, as will best suit the figures of the arms. See the Baronet's escutcheon in pl. 8. 2dly, The ancient and respectable badge of the most noble Order of the Garter, instituted by king Edward III. 1349, in the 27th year of his reign. This honourable augmentation is a deep blue garter, surrounding the arms of such knights, and inscribed with his motto, "*Honi soit qui mal y pense*." See the plate.

The arms of those who are knights of the orders of the Bath, of the Thistle, or of St. Patrick, are marshalled in the same manner, with this difference only, that the colour and motto accord with the order to which it belongs. Thus the motto "*Quis separabit* 1783" on the light blue ribbon of the order, surrounds the escutcheon of a knight of St. Patrick. "*Nemo me impune lacessit*," on a green ribband, distinguishes a knight of the Thistle; and "*Tria juncta in uno*," on red, a knight of the Bath. It is to be observed, that none of the orders of *Knighthood* are hereditary. The honours of a Baronet of Ulster, and of a Baronet of Nova Scotia (created by patent in 1602), descend to the heirs-male.

With regard to the emblazoning of the wife's arms in the case of the husband being noble, or a knight of the Garter, of the Bath, &c. or where, on the other hand, the wife is noble in her own right, and the husband a commoner, these will be found fully exemplified in plate 5.

For representations of the BADGES of the several Orders of Knighthood, see plate 7.

CHAP. VII.

Of FUNERAL ESCUTCHEONS.

AFTER having treated of the essential parts of coats-of-arms, of the various charges and ornaments usually borne therewith, of their attributes and dispositions, and of the rules for blazoning and marshalling them, we shall next describe the several funeral escutcheons, usually called *hatchments*; whereby may be known, after any person's decease, what rank either he or she held when living; and if it be a gentleman's hatchment, whether he was a bachelor, married man, or widower, with the like distinctions for gentlewomen.

The hatchment is usually affixed to the fronts of houses, when any of the nobility or gentry die. The arms, if the deceased be a private gentleman, are parted per Pale with those of his wife. The ground without the escutcheon being black, denotes the man to be dead; and the ground on the sinister side being white,

signifies that the wife is living, which is distinctly shown in plate 8, where also all the varieties of hatchments are displayed, according to the following descriptions.

When a *married gentleman* dies first, the hatchment is distinguished by a contrary colour from the former; that is, the arms on the sinister-side have the ground without the escutcheon black; whereas those on the dexter-side, for her surviving husband, are upon a white ground: the hatchment of a gentleman is, moreover, differenced by a cherub over the arms instead of a crest.

When a *bachelor* dies, his arms may be depicted single or quartered, with a crest over them, but never impaled as the two first are, and all the ground without the escutcheon is also black.

When a *maid* dies, her arms, which are placed in a lozenge, may be single, or quartered, as those of a bachelor: all the ground without the escutcheon is also black.

When a *widower* dies, his arms are represented impaled with those of his deceased wife, having a crest, and sometimes a helmet and mantling over them, and all the ground without the escutcheon black.

When a *widow* dies, her arms are also represented impaled with those of her deceased husband, but inclosed in a lozenge, and a cherub is placed over them; all the ground without the escutcheon is also black.

If a widower or bachelor should happen to be the last of his family, a death-head is generally annexed to each hatchment, to denote that death has conquered all.

By the fore-mentioned rules, which are sometimes neglected through the ignorance of illiterate people, may be known, upon the sight of any hatchment, what branch of the family is dead; and by the helmet, coronet, &c. what title and degree the deceased person held. The same rules are observed with respect to the escutcheons placed on the hearse and horses used in pompous funerals, except that they are not surmounted with any crest, as in the foregoing examples of hatchments, but are always plain. It is necessary, however, to ensign those of peers with coronets, supporters, &c. and that of a maiden lady with a knot of ribbands. For various other examples of hatchments see the plate already referred to.

C H A P. VIII.

Of PRECEDENCY.

IN forming the present Treatise, we can by no means omit giving some account of the laws which govern the *precedency of the different ranks* which compose the community of Great Britain. This, by permission of its author, George Naylor, Esq. York Herald, and Genealogist of the Order of the Bath, (to whose indulgence we are in like manner exclusively indebted for nearly the whole of the engravings that accompany this part of our publication), we take from an elegant engraved "*Chart of Blazonry*," which comprehends every thing necessary to be known in English heraldry, and is extremely convenient for hanging up in the libraries of noblemen and gentlemen. We shall divide these tables of precedency into two parts.

SECT. I. Of the Precedency of Men.

THE first personage in point of precedency, is of course—

The KING.

Prince of Wales.

King's Sons.

King's Brothers.

King's Uncles.

King's Grandsons.

King's Nephews.

Vicegerent, when any such Officer.

Archbishop of Canterbury, Lord Primate of all England.

Lord High Chancellor, or Lord Keeper.

Archbishop of York, Primate of England.

Lord High Treasurer.

Lord President of the Privy Council.

Lord Privy Seal.

Lord High Constable in commission.

Hereditary Earl Marshal.

Lord High Admiral.

Lord Steward of his Majesty's Household.

Lord Chamberlain of his Majesty's Household.

Dukes, according to Patents of Creation.

Marquisses, according to their Patents.

Dukes' eldest Sons.

Earls, according to their Patents.

Marquisses' eldest Sons.

Dukes' younger Sons.

Viscounts, according to their Patents.

Earls' eldest Sons.

Marquisses' younger Sons.

Bishops of London, Durham, Winchester.

Bishops, according to seniority of consecration; but if any

Bishop be Principal Secretary of State, he shall be placed above all other Bishops not having any of the great offices before mentioned.

Barons, according to their Patents of Creation; but if any

Baron be Principal Secretary of State, he shall be placed above all Barons, unless they have any of the great offices before mentioned.

Speaker of the House of Commons.

Viscounts' eldest Sons.

Earls' younger Sons.

Barons' eldest Sons.

Knights of the most noble Order of the Garter.

Privy Councillors.

Chancellor of the Exchequer.

Chancellor of the Duchy of Lancaster.

Lord Chief Justice of the King's Bench.

Master of the Rolls.

Lord Chief Justice of the Common Pleas.

Lord Chief Baron of the Exchequer.

Judges, Barons, of the degree of the Coif of the said Courts, according to seniority.

Bannerets, made under the King's own Royal Standard, displayed in an Army Royal, in open War, by the King himself in person, for the term of their lives only.

Viscounts' younger Sons.

Barons' younger Sons.

Baronets.

Bannerets, not made by the King in person.

Knights of the most honourable Order of the Bath.

Knights Bachelors.

Baronets' eldest Sons.

Knights' of the Garter eldest Sons.

Bannerets' eldest Sons.

Knights' of the Bath eldest Sons.

Knights' eldest Sons.

Serjeants at Law, DD. LLD. MD. of English Universities.

Baronets' younger Sons.

Esquires of the King's creation, by the imposition of a collar of SS.

Esquires attending Knights of the Bath.

Esquires by office, as Justices of the Peace.

Captains, Gentlemen of the Privy Chamber, &c.

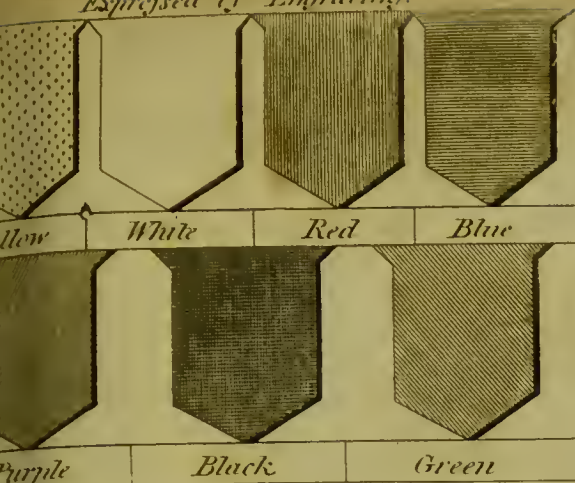
Knights' of the Garter younger Sons.

Bannerets' of both kinds younger Sons.

Knights' of the Bath younger Sons.

Colours.

Expressed by Engraving.



Roundles.

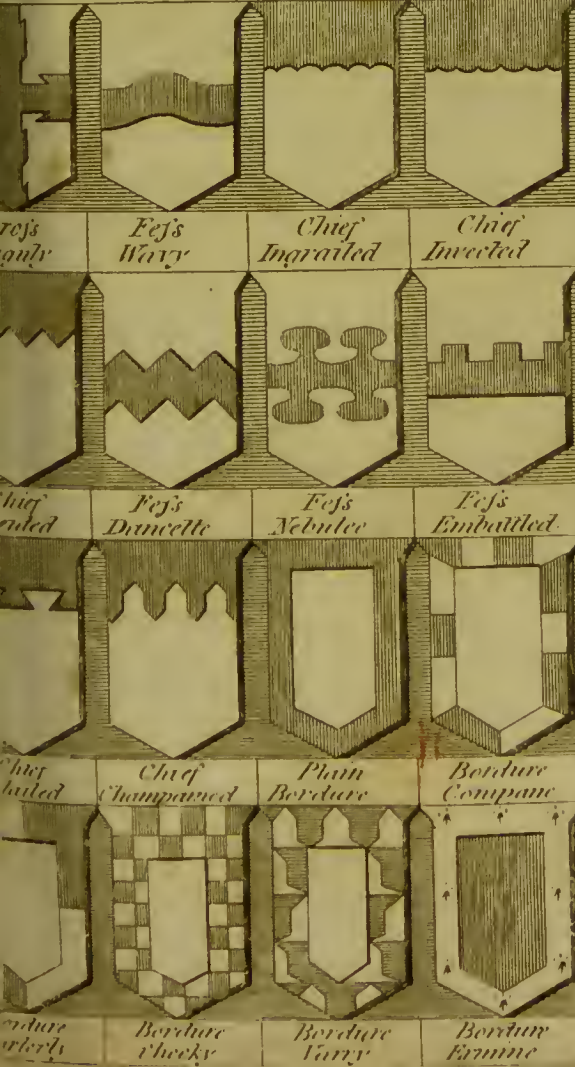


Lines.

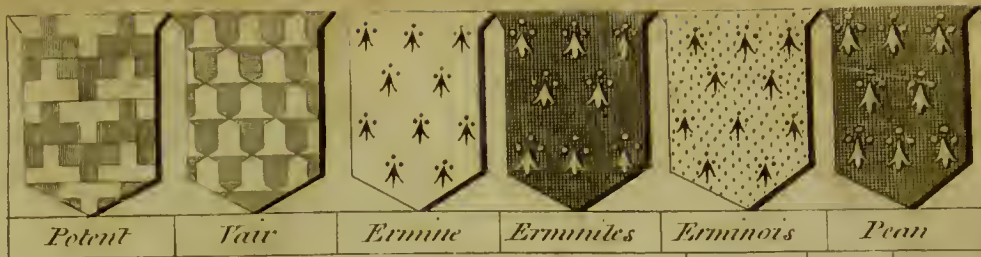


Lines.

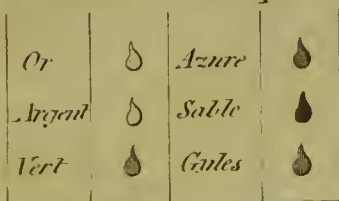
their several Names when applied to Crofs Fejs &c



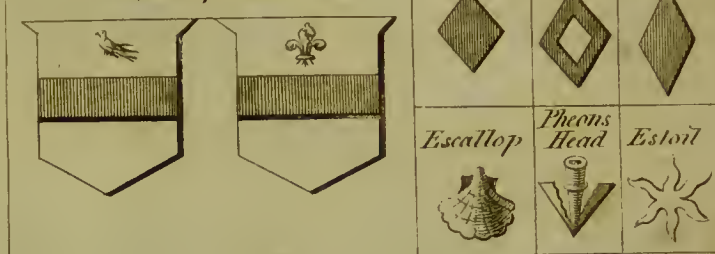
Furs.



Gutte' or Drops.



Examples of Differences



Knight of the Garter (being a Commoner)



Arms of a knight of the Bath being a Commoner & his Lady



Barons in her own Right

Differences of the Royal Family.



Table of Houses.



Arms of a Commoner & his Lady being a Barons in her own Right, with supporters.



CHARGES &c. used in Coat Armour.

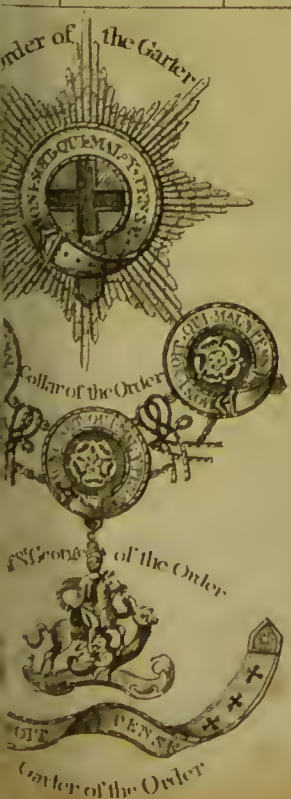
Note. Most of these have their Diminutives when borne in greater number in the same escutcheon.

<i>Cross</i>	<i>Potent</i>	<i>Patee</i>	<i>Fimbriated</i>	<i>Moline Pierced</i>	<i>Patonce</i>	<i>Botone</i>	<i>Flory</i>	<i>Crozier</i>	<i>Voided</i>	<i>Fourhy</i>
<i>Flury</i>	<i>Couped Pierced</i>	<i>Moline Voided</i>	<i>Crozier Fitcher</i>	<i>Avelane</i>	<i>Moline</i>	<i>Patonce Voided</i>	<i>Double Fitcher</i>	<i>Calvary</i>	<i>Ponce</i>	<i>Crampon</i>
<i>Barbet</i>	<i>5 Lozenges in Cross</i>	<i>Quarterly Quartered</i>	<i>Treasure of half Fleur de Lis</i>	<i>Crescental</i>	<i>Corded</i>	<i>Pall</i>	<i>Passion</i>	<i>Quadrant</i>	<i>Fretty</i>	<i>Rayonnant</i>
<i>Patriarchal</i>	<i>Voided & Couped</i>	<i>Quarter Pierced</i>	<i>Giron</i>	<i>Per Cross</i>	<i>Per Saltire</i>	<i>Per Chevron</i>	<i>Per Pale</i>	<i>Per Bend</i>	<i>Per Fess</i>	<i>Saltire</i>
<i>Saltire marked of a Cross</i>	<i>Cheif</i>	<i>Canton</i>	<i>Pale</i>	<i>Rayonnant</i>	<i>Paly</i>	<i>Bend</i>	<i>Bend sinister</i>	<i>Bend Colised</i>	<i>Bendlet</i>	<i>Bendy</i>
<i>Baton</i>	<i>Baton sinister</i>	<i>Fess</i>	<i>Barrs</i>	<i>Chevron</i>	<i>Chevronds</i>	<i>Pile</i>	<i>Flasques</i>	<i>Bordure</i>	<i>Barry of 6</i>	<i>Escutcheon of Prevalence</i>
<i>Mill Rind</i>	<i>Orle</i>	<i>Lozenge</i>	<i>two Bars Gables</i>	<i>Rays of the Sun issuing from a Cloud</i>	<i>a Bend Flory</i>	<i>in Bend</i>	<i>on a Bend</i>	<i>Fret</i>	<i>Fretty</i>	<i>Cheeky</i>
<i>Double Trezure</i>	<i> borne by Archbishops</i>	<i>Battering Rams</i>	<i>Inescutcheon</i>	<i>Addorsed</i>	<i>Respecting</i>	<i>Hauriant</i>	<i>Vaillant</i>	<i>Cygnets</i>	<i>Peacock in her Pride</i>	<i>Phaenix</i>
<i>Lion vulning</i>	<i>Beacon</i>	<i>Portentice</i>	<i>Catherine Wheel</i>	<i>Escarbuncle</i>	<i>Guauntlet</i>	<i>Mantich</i>	<i>Fountain</i>	<i>Water Bouget</i>	<i>Cart</i>	<i>Cinquépil</i>



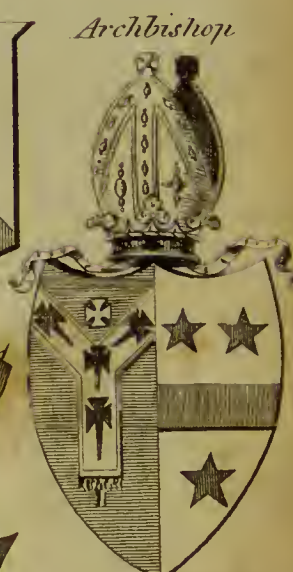
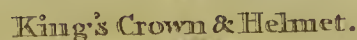
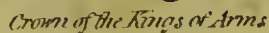
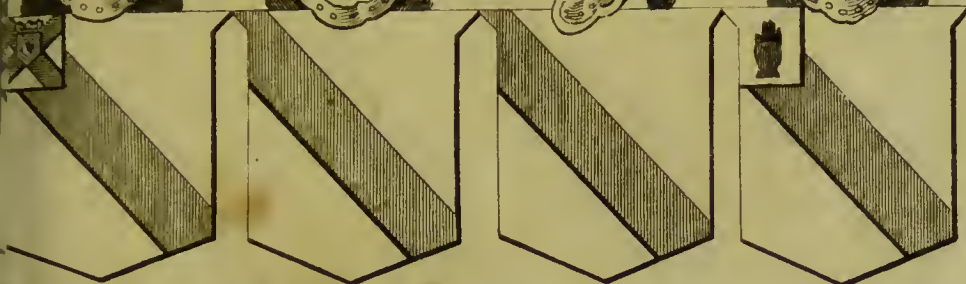
CHARGES &c used in Coat Armour.

<i>Passant guardant</i>	<i>Passant</i>	<i>Passant guardant</i>	<i>Passant regardant</i>	<i>Couchant</i>	<i>Dormant</i>	<i>Rampant</i>	<i>Tricorporated</i>	<i>Rampant conjoined</i>	<i>Asist</i>	<i>Stat' & Arm'd</i>
<i>Rampant guardant</i>	<i>Rampant</i>	<i>Rampant</i>	<i>Salient</i>	<i>Demi Ramp' Erased</i>	<i>Rampant double headed</i>	<i>Demi Passant Couped</i>	<i>Erased & Dually Gorged</i>	<i>Naisant</i>	<i>Rampant Dismembered</i>	<i>Ramp' Guardant Debraised</i>
<i>Couant</i>	<i>Double queue</i>	<i>Nowed</i>	<i>Couped and Dually Crowned</i>	<i>Rampant Combattant</i>	<i>Rampant Addorsed</i>	<i>Displayed</i>	<i>Lion Dragon</i>	<i>Antelope</i>	<i>Wyvern</i>	
<i>Griffin Statant</i>	<i>Dragon</i>	<i>Cockatrice displayed</i>	<i>Wyvern sans Legs</i>	<i>Wyvern sans Wings</i>	<i>Sphinx Passant</i>	<i>Harpy</i>	<i>Displayed</i>	<i>Holy Lamb Passant</i>	<i>Toison</i>	
<i>Springing</i>	<i>at Gaze</i>	<i>Courant</i>	<i>Lodged</i>	<i>Cabossed</i>	<i>As his Attire</i>	<i>Talbot Passant</i>	<i>Man Tiger</i>	<i>Rising</i>	<i>Displayed or Spread</i>	
<i>Close</i>	<i>Rising</i>	<i>Martlet</i>	<i>Allerion</i>	<i>Wings Erect</i>	<i>Inverted</i>	<i>Griffin sans Wings</i>	<i>Cherub</i>	<i>Quatrefoil</i>	<i>Trefoil</i>	

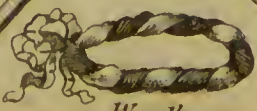
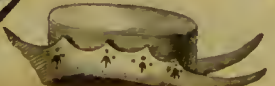
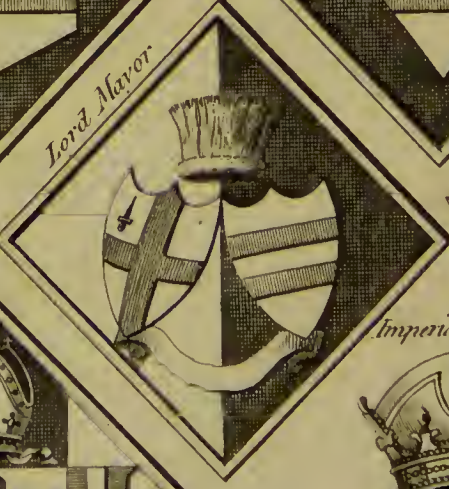




Method of Marshalling the ARMS of the Wife or Wives.



HATCHMENTS



Chapeau or Cap of Dignity

Wrath
Bark and pulp

Copy of State borne by the Lord Mayor.



Knights Bachelors' younger Sons.
Gentlemen entitled to bear arms.
Gentlemen by office, function, or profession.
Clergymen.
Attorneys at Law, &c.
Citizens.
Burgesses, &c.

SECT. II. *Precedency of Women.*

THE QUEEN.
Princess of Wales.
Princess Royal.
Daughters of the King.
Duchess of York, and
Wives of the King's younger Sons.
Wives of the King's Brothers.
Wives of the King's Uncles.
Wives of the eldest Sons of Dukes, of the Blood Royal.
Daughters of Dukes, of the Blood Royal.
Wives of the King's Brothers' or Sisters' Sons.
Duchesses.
Marchionesses.
Wives of the eldest Sons of Dukes.
Daughters of Dukes.
Countesses.
Wives of the eldest Sons of Marquesses.
Daughters of Marquesses.
Wives of the younger Sons of Dukes.
Viscountesses.
Wives of the eldest Sons of Earls.
Daughters of Earls.
Wives of the younger Sons of Marquesses.
Baronesses.
Wives of the eldest Sons of Viscounts.
Daughters of Viscounts.
Wives of the younger Sons of Earls.
Wives of the eldest Sons of Barons.
Daughters of Barons.
Wives of the younger Sons of Viscounts.
Wives of the younger Sons of Barons.
Dames, Wives of Baronets.
Wives of Knights of the Garter.
Wives of Bannerets of each kind.
Wives of Knights of the Bath.
Wives of Knights Bachelors.
Wives of the eldest Sons of Baronets.
Daughters of Baronets.
Wives of the eldest Sons of Knights of the Garter.
Daughters of Knights of the Garter.
Wives of the eldest Sons of Bannerets of each kind.

Daughters of Bannerets of each kind.
Wives of the eldest Sons of Knights of the Bath.
Daughters of Knights of the Bath.
Wives of the eldest Sons of Knights Bachelors.
Wives of Serjeants at Law, DD. LLD. MD. of English Universities.
Wives of the younger Sons of Baronets.
Daughters of Knights Bachelors.
Wives of Esquires, attendants on Knights of the Bath.
Wives of Esquires by office, as Justices of the Peace.
Wives of Captains, Gentlemen of the Privy Chamber, &c.
Wives of the younger Sons of Knights of the Garter.
Wives of the younger Sons of Bannerets of each kind.
Wives of the younger Sons of Knights of the Bath.
Wives of the younger Sons of Knights Bachelors.
Wives of Gentlemen lawfully bearing Coat Armour.
Daughters of Esquires lawfully bearing Coat Armour, who are Gentlewomen by birth.
Daughters of Gentlemen lawfully bearing Coat Armour, who are Gentlewomen by birth.
Wives of Gentlemen by office, function, or profession, as Clergymen, and Attorneys at Law, &c. &c.
Wives of Citizens.
Wives of Burgesses, &c.

SECT. III. *Of Styles.*

A SUBJECT nearly connected with precedency is that indicated by the title of this section. By the term *style* in heraldry, is meant that kind of language in which, according to its laws, a person of one rank is bound to address an individual of another; as at the commencement of a petition, memorial, or public address.

In this view, the KING is styled "Most High, Most Mighty, and Most Excellent Monarch."—PRINCE of WALES, "Most High, most Mighty, and most Illustrious Prince."—ARCHBISHOP, "Most Reverend Father in God."—DUKE, "Most High, Mighty, and most Noble Prince."—MARQUIS, "Most Noble and Mighty Prince."—EARL, "Most Noble and Mighty Lord."—BISHOP, "Right Reverend Father in God."—VISCOUNT and BARON, "Most Noble Lord."

Of Royal and Noble Female Personages, the QUEEN is styled "Most High, Most Mighty, and Most Excellent Princesses."—PRINCESS of the BLOOD ROYAL, "Most Illustrious Princesses."—DUCHESS, "Most High, Mighty, and most Noble Princesses."—MARCHIONESS, "Most Noble and Puissant Princesses."—COUNTESS, "Most Noble and Puissant Lady."—VISCOUNTESS and BARONESS, "Most Noble Lady."

The styles which custom confers on those inferior ranks of the community to whom heraldic distinctions belong, are too well known to need any description.

H E R

HERALDUS (Desiderius), in French *Herault*, a counsellor of the parliament of Paris, has given good proofs of uncommon learning by very different works. His *Adversaria* appeared in 1599; which little book, if the *Scaligerana* may be credited, he repented the having published. His notes on Tertullian's Apology, on Minutius Felix, and on Arnobius, have been esteemed. He also wrote notes on Martial's Epigrams. He disguised himself under the name of *David Leidbrufferus*, to write a political dissertation on the independence of kings, some time after the death of Henry IV. He had a controversy with Salmasius, *De jure Attico ac Romano*; but did not live to finish what he had written on that subject. What he had done, however, was printed in 1650. He died in June 1649. Guy Patin says, that "he was looked upon as a very learned man, both in the civil law and in polite literature, and wrote with great facility on any subject he pitched on." Daille, speaking of such Protestant writers as condemned the executing of Charles I. king of England, quotes the *Pacificque Royal en deuil*, by Herault. This author, son to our Desiderius Heraldus, was a minister in Normandy, when he was called to the service of the Walloon-church of London under Charles I. and he was so zealous a royalist that he was forced to fly to France, to escape the fury of the commonwealths men. He returned to England after the Restoration, and resumed his ancient employment in

H E R

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the Walloon-church at London; some time after which he obtained a canonry in the cathedral of Canterbury, and enjoyed it till his death.

HERB, in botany; a name by which Linnæus denominates that portion of every vegetable which arises from the root, and is terminated by the fructification. It comprehends, 1. The trunk, stalk, or stem. 2. The leaves. 3. Those minute external parts called by the same author the *fulcra* or supports of plants. 4. The buds, or, as he also terms them, the *winter-quarters* of the future vegetable.

HERB-*Christopher*. See *ACTÆA*.

HERB-*Robert*, a species of *GERANIUM*. This plant is in great repute with some farmers on account of its supposed virtues against staling of blood and the bloody-flux in cattle, in which cases it is said to be of great service.

HERBACEOUS PLANTS, are those which have succulent stems or stalks that lie down to the ground every year. Of herbaceous plants, those are annual which perish stem and root and all every year; biennial, which subsist by the roots two years; perennial, which are perpetuated by their roots for a series of years, a new stem being produced every spring.

HERBAGE, in law, signifies the pasture provided by nature for the food of cattle; also the liberty to feed cattle in the forest, or in another person's ground.

HERBAL, signifies a book that treats of the classes, genera, species, and virtues of plants. The same term is sometimes also used for what is more usually called *hortus siccus*. See *HORTUS*.

HERBELOT (Bartholomew d'), a French writer, eminent for his oriental learning, was born at Paris in 1625. He travelled several times into Italy, where he obtained the esteem of some of the most learned men of the age. Ferdinand II. grand duke of Tuscany, showed him many marks of his favour: a library being exposed to sale at Florence, the duke desired him to examine the manuscripts in the oriental languages, to select the best of them, and to mark the price; which being done, that generous prince purchased them, and made him a present of them. M. Colbert, being at length informed of Herbelot's merit, recalled him to Paris, and obtained a pension for him of 1500 livres: he afterwards became secretary and interpreter of the oriental languages, and royal professor of the Syriac tongue. He died at Paris in 1695. His principal work is intitled *Bibliothèque Orientale*, which he first wrote in Arabic, and afterwards translated into French. It is greatly esteemed. M. Herbelot's modesty was equal to his erudition; and his uncommon abilities were accompanied with the utmost probity, piety, and charity, which he practised through the whole course of his life.

HERBERT (Mary), countess of Pembroke, was sister of the famous Sir Philip Sidney, and wife of Henry earl of Pembroke. She was not only a lover of the muses, but a great encourager of polite literature; a character not very common among ladies. Her brother dedicated his incomparable romance *Arcadia* to her, from which circumstance it hath been called *The Countess of Pembroke's Arcadia*. She translated a dramatic piece from the French, intitled *Antonius*, a tragedy; though it is said she was assisted by her lord's chaplain, Dr. Babington, afterwards bishop of Exeter. She also turned the psalms of David into English metre; but it is doubtful whether these works were ever printed. She died in 1621; and an exalted character of her is to be found in Francis Osborne's memoirs of king James I.

HERBERT (Edward), lord Herbert of Cherbury in Shropshire, an eminent English writer, was born in 1581, and educated at Oxford; after which he travelled, and at his return was made knight of the Bath. James I. sent him ambassador to Louis XIII. in behalf of the Protestants who were besieged in several

cities of France; and continued in this station till he was recalled, on account of a dispute between him and the constable de Luines. In 1625 he was advanced to the dignity of a baron in the kingdom of Ireland, by the title of lord Herbert of Castle-Island; and in 1631 to that of lord Herbert of Cherbury in Shropshire. After the breaking out of the civil wars, he adhered to the parliament; and in 1644 obtained a pension, on account of his having been plundered by the king's forces. He wrote A History of the Life and Reign of Henry VIII. which was greatly admired; a treatise *De veritate*; and several other works. He died at London in 1633. "Lord Herbert (says Mr. Granger) stands in the first rank of the public ministers, historians, and philosophers of his age. It is hard to say whether his person, his understanding, or his courage, was the most extraordinary; as the fair, the learned, and the brave, held him in equal admiration. But the same man was wise and capricious; redressed wrongs, and quarrelled for puerilities; hated bigotry in religion, and was himself a bigot in philosophy. He exposed himself to such dangers as other men of courage would have carefully declined: and called in question the fundamentals of a religion, which none had the hardiness to dispute besides himself."

HERBERT (George), an English poet and divine, was brother to the preceding. He was born in 1593, and educated at Cambridge. In 1619 he was chosen public orator of that university, and afterwards obtained a sinecure from the king. In 1626 he was collated to the prebend of Layton Ecclesia, in the diocese of Lincoln; and in 1630 was inducted into the rectory of Bamerton, near Sarum. The great lord Bacon had such an opinion of his judgment, that he would not suffer his works to be printed before they had passed his examination. He wrote a volume of devout poems, called *The Temple*, and another intitled *The Priest of the Temple*. This pious divine died about the year 1635.

HERBERT (William), earl of Pembroke, was born at Wilton in Wiltshire, 1580, and admitted of New-college in Oxford in 1592, where he continued about two years. In 1601 he succeeded to his father's honours and estate; was made K. G. in 1604; and governor of Portsmouth six years after. In 1626 he was elected chancellor of the university of Oxford; and about the same time made lord steward of the king's household. He died suddenly at his house called *Baynard's castle*, in London, April 10, 1630; according to the calculation of his nativity, says Wood, made several years before by Mr. Thomas Allen of Gloucester-hall. Clarendon relates concerning this calculation, that some considerable persons connected with lord Pembroke being met at Maidenhead, one of them at supper drank a health to the lord steward: upon which another said, that he believed his lordship was at that time very merry; for he had now outlived the day, which it had been prognosticated upon his nativity he would not outlive; but he had outlived it now, for that was his birth-day, which had completed his age to 50 years. The next morning, however, they received the news of his death. Whether the noble historian really believed this and other accounts relating to astrology, apparitions, providential interpositions, &c. which he has inserted in his history, we do not presume to say: he delivers them, however, as if he did not actually disbelieve them. Lord Pembroke was not only a great favourer of learned and ingenious men, but was himself learned, and endued with a considerable share of poetic genius. All that are extant of his productions in this way were published with this title: "Poems written by William Earl of Pembroke, &c. many of which are answered by way of reparation by Sir Benjamin Rudyard, with other Poems written by them occasionally and apart, 1660, 8vo."

HERBERT (Sir Thomas), an eminent gentleman of the Pembroke family, was born at York, where his father was an

alderman. William earl of Pembroke sent him to travel at his expence in 1626, and he spent four years in visiting Asia and Africa: his expectations of preferment ending with the death of the earl, he went abroad again, and travelled over several parts of Europe. In 1634 he published, in folio, *A Relation of some Years Travel into Africa and the Great Asia*, especially the Territories of the Persian Monarchy, and some parts of the Oriental Indies and Isles adjacent. On the breaking out of the civil war, he adhered to the parliament; and at Oldenby, on the removal of the king's servants, by desire of the commissioners from the parliament, he and James Harrington were retained as grooms of his bed-chamber, and attended him even to the block. At the restoration he was created a baronet by Charles II. for his faithful services to his father during his two last years. In 1678 he wrote *Tbrondia Carolina*, containing an account of the two last years of the life of Charles I.; and he assisted Sir William Dugdale in compiling the third volume of his *Monasticon Anglicanum*. He died at York in 1682, leaving several MSS to the public library at Oxford, and others to that of the cathedral at York.

HERCULANEUM is the name of an ancient city of Campania in Italy, which was destroyed by an eruption of Vesuvius in the first year of the emperor Titus, or the 79th of the Christian era, and lately rendered famous on account of the curious monuments of antiquity discovered in its ruins; an account of which has been published by order of the king of Naples, in a work of six volumes folio. The epocha of the foundation of Herculaneum is unknown. Dionysius Halicarnassensis conjectures that it may be referred to 60 years before the war of Troy, or about 1342 years before Christ; and therefore that it lasted about 1400 years.

The thickness of the heap of lava and ashes by which the city was overwhelmed, has been much increased by fiery streams vomited since that catastrophe; and now forms a mass 24 feet deep of dark grey stone, which is easily broken to pieces. By its non-adhesion to foreign bodies, marbles and bronzes are preserved in it as in a case made to fit them, and exact moulds of the faces and limbs of statues are frequently found in this substance. The precise situation of this subterraneous city was not known till the year 1713, when it was accidentally discovered by some labourers, who, in digging a well, struck upon a statue on the benches of the theatre. Many others were afterwards dug out and sent to France by the prince of Elbœuf. But little progress was made in the excavations till Charles, infant of Spain, ascended the Neapolitan throne; by whose unwearied efforts and liberality a very considerable part of Herculaneum has been explored, and such treasures of antiquity drawn out as form the most curious museum in the world. It being too arduous a task to attempt removing the covering, the king contented himself with cutting galleries to the principal buildings, and causing the extent of one or two of them to be cleared. Of these the theatre is the most considerable. On a balustrade which divided the orchestra from the stage, was found a row of statues; and, on each side of the pulpitum, the equestrian figure of a person of the Nonia family. They are now placed under porticos of the palace; and from the great rarity of equestrian statues in marble would be very valuable objects, were their workmanship even less excellent than it is: one of them in particular is a very fine piece of sculpture. Since the king of Spain left Naples, the digging has been continued, but with less spirit and expenditure: indeed the collection of curiosities brought out of Herculaneum and Pompeii is already so considerable, that a relaxation of zeal and activity becomes excusable. They are now arranged in a wing of the palace; and consist not only of statues, busts, altars, inscriptions, and other ornamental appendages of opulence and luxury,

but also comprehend an entire assortment of the domestic, musical, and chyrurgical instruments used by the ancients; tripods of elegant form and exquisite execution, lamps in endless variety, vases and basins of noble dimensions, chandeliers of the most beautiful shapes, pateras and other appurtenances of sacrifice, looking-glasses of polished metal, coloured glass so hard, clear, and well stained, as to appear emeralds, sapphires, and other precious stones; a kitchen completely fitted up with copper-pans lined with silver, kettles, cisterns for heating water, and every utensil necessary for culinary purposes; specimens of various sorts of combustibles, retaining their form though burnt to a cinder; corn, bread, fish, oil, wine, and flour: a lady's toilet, fully furnished with combs, thimbles, rings, paint, ear-rings, &c. Among the statues, which are numerous, connoisseurs allow the greatest share of merit to a Mercury and a sleeping faun: the busts fill several rooms; but very few of the originals whom they were meant to imitate are known. The floors are paved with ancient Mosaic. Few rare medals have been found in these ruins; the most curious is a gold medallion of Augustus, struck in Sicily in the 15th year of his reign. The fresco paintings, which, for the sake of preservation, have been torn off the walls and framed and glazed, are to be seen in another part of the palace. "The elegance of the attitudes, and the infinite variety of the subjects (Mr. Swinburne observes), stamp them as performances worthy of the attention of artists and antiquarians; but no pictures yet found are masterly enough to prove that the Greeks carried the art of painting to as great a height of perfection as they did that of statuary. Yet can we suppose those authors incapable of appreciating the merits of an Apelles or a Zeuxis, who with so much critical discernment have pointed out the beauties of the works of a Phidias or a Praxiteles, beauties that we have still an opportunity of contemplating? would they have bestowed equal praises upon both kinds of performances, if either of them had been much inferior to the other? Certainly it is not probable; and we must presume, that the capital productions of the ancient painters, being of more perishable materials than busts and statues, have been destroyed in the fatal disasters that have so often afflicted both Greece and Italy. Herculaneum and Pompeii were but towns of the second order, and not likely to possess the master-pieces of the great artists, which were usually destined to adorn the more celebrated temples, or the palaces of kings and emperors." A more valuable acquisition than bronzes and pictures was thought to be made, when a large parcel of manuscripts was found among the ruins. Hopes were entertained that many works of the classics, which time has deprived us of, were now going to be restored to light, and that a new mine of science was on the point of being opened. But the difficulty of unrolling the burnt parchment, of pasting the fragments on a flat surface, and of decyphering the obscure letters, have proved such obstacles, that very little progress has been made in the work. A priest invented the method of proceeding; but it would require the joint labours of many learned to carry on so nice and tedious an operation with any success. The plan is dropped; and the manuscripts now lie in dusty heaps, as useless to the learned world as they had been for the preceding seventeen centuries.

HERCULES, in fabulous history, a most renowned Grecian hero, who, after death, was ranked among the gods, and received divine honours. According to the ancients, there were many persons of the same name. Diodorus mentions three, Cicero six, and some authors extend the number to no less than forty-three. Of all these, one generally called the *Theban Hercules*, is the most celebrated; and to him, as may easily be imagined, the actions of the others have been attributed. He is reported to have been the son of Jupiter by Alcmena (wife to Amphitryon king of Argos), whom Jupiter

enjoyed in the shape of her husband while he was absent ; and in order to add the greater strength to the child, made that amorous night as long as three. Amphitryon having soon after accidentally killed his uncle and father-in-law Electryon, was obliged to fly to Thebes, where Hercules was born. The jealousy of Juno, on account of her husband's amour with Alcmena, prompted her to destroy the infant. For this purpose she sent two serpents to kill him in the cradle, but young Hercules strangled them both. He was early instructed in the liberal arts, and Castor the son of Tyndarus taught him how to fight, Eurytus how to shoot with a bow and arrows, Autolycus to drive a chariot, Linus to play on the lyre, and Eumolpus to sing. He, like the rest of his illustrious contemporaries, soon after became the pupil of the centaur Chiron, and under him he perfected and rendered himself the most valiant and accomplished of the age. In the 18th year of his age he resolved to deliver the neighbourhood of mount Cithæron from a huge lion which preyed on the flocks of Amphitryon his supposed father, and which laid waste the adjacent country. He went to the court of Theseus king of Theseis, who shared in the general calamity ; and he received here a tender treatment, and was entertained during 50 days. The 50 daughters of the king became mothers by Hercules during his stay at Theseis, and some say that it was effected in one night. After he had destroyed the lion of mount Cithæron, he delivered his country from the annual tribute of 100 oxen which it paid to Erginus. Such public services became universally known ; and Creon, who then sat on the throne of Thebes, rewarded the patriotic deeds of Hercules by giving him his daughter in marriage, and entrusting him with the government of his kingdom.

Eurystheus, the son of Amphitryon, having succeeded his father, soon became jealous of Hercules ; and fearing lest he might by him be deprived of his crown, left no means untried to get rid of him. Of this Hercules was not insensible, because he was perpetually engaging him on some desperate expedition ; and therefore went to consult the oracle. But being answered that it was the pleasure of the gods that he should serve Eurystheus 12 years, he fell into a deep melancholy, which at last ended in a furious madness ; during which, among other desperate actions, he put away his wife Megara, and murdered all the children he had by her. As an expiation of this crime, the king imposed upon him twelve labours surpassing the power of all other mortals to accomplish, which nevertheless our hero performed with great ease. The favours of the gods had indeed completely armed him when he undertook his labours. He had received a coat of armour and helmet from Minerva, a sword from Mercury, a horse from Neptune, a shield from Jupiter, a bow and arrows from Apollo, and from Vulcan a golden cuirass and brazen buskin, with a celebrated club of brass according to the opinion of some writers.

The first labour imposed upon him was the killing of a lion in Nemea, a wood of Achaia : whose hide was proof against any weapon, so that he was forced to seize him by the throat and strangle him. He carried the dead animal on his shoulders to Mycenæ, and ever after clothed himself with the skin. Eurystheus was so astonished at the sight of the beast, and at the courage of Hercules, that he ordered him never to enter the gates of the city when he returned from his expeditions, but to wait for his orders without the walls. He even made himself a brazen vessel, into which he retired whenever Hercules returned. The second labour was to destroy the Lernaean hydra, which had seven heads according to Apollodorus, 50 according to Simonides, and 100 according to Diodorus. This celebrated monster he first attacked with his arrows ; but soon after he came to a close engagement, and by means of his heavy club he destroyed the heads of his enemy. This, however, was pro-

ductive of no advantage ; for as soon as one head was beaten to pieces by the club, immediately two sprang up ; and the labour of Hercules would have remained unfinished, had not he commanded his friend Iolas to burn with a hot iron the root of the head which he had crushed to pieces. This succeeded ; and Hercules became victorious, opened the belly of the monster, and dipped his arrows in the gall to render the wounds which he gave fatal and incurable. He was ordered in his third labour to bring alive and unhurt into the presence of Eurystheus a stag, famous for its incredible swiftness, its golden horns, and brazen feet. This celebrated animal frequented the neighbourhood of Cœnoë ; and Hercules was employed for a whole year in continually pursuing it : at last he caught it in a trap, or when tired, or, according to others, by slightly wounding it and lessening its swiftness. The fourth labour was to bring alive to Eurystheus a wild boar, which ravaged the neighbourhood of Erymanthus. In this expedition he destroyed the centaurs, and caught the boar by closely pursuing him through the deep snow. Eurystheus was so frightened at the sight of the boar, that, according to Diodorus, he hid himself in his brazen vessel for some days. In his fifth labour Hercules was ordered to clean the stables of Augeas, where 3000 oxen had been confined for many years. For his sixth labour he was ordered to kill the carnivorous birds which ravaged the country near the lake Stympalis in Arcadia. In his seventh labour he brought alive into Peloponnesus a prodigious wild bull which laid waste the island of Crete. In his eighth labour he was employed in obtaining the mares of Diomedes, which fed upon human flesh. He killed Diomedes, and gave him to be eat by his mares, which he brought to Eurystheus. They were sent to mount Olympus by the king of Mycenæ, where they were devoured by the wild beasts ; or, according to others, they were consecrated to Jupiter, and their breed still existed in the age of Alexander the Great. For his ninth labour, he was commanded to obtain the girdle of the queen of the Amazons. In his tenth labour he killed the monster Geryon king of Gades, and brought to Argos his numerous flocks which fed upon human flesh. This was in Iberia or Spain ; in the furthest parts of which he erected his two pillars, as the utmost limits of the then known world. These ten labours he achieved, as the fable says, in about eight years. In this last expedition he is likewise affirmed to have killed Antæus, a famous giant of a monstrous size, who, when weary with wrestling or labour, was immediately refreshed by touching the earth. Hercules overcame him in wrestling, and slew him ; and after him the tyrant Busiris, in his way through Egypt. This bloody man used to sacrifice all his guests and strangers upon his altars ; and designing to have done the same by Hercules, was slain by him, together with all his attendants. His eleventh labour was the carrying away the Hesperian golden apples kept by a dragon (See HESPERIDES). The twelfth and last, and most dangerous of his labours, was to bring upon earth the three-headed dog Cerberus. Descending into hell by a cave on mount Tænarus, he was permitted by Pluto to carry away his friends Theseus and Pirithous, who were condemned to punishment in hell ; and Cerberus also was granted to his prayers, provided he made use of no arms but only force to drag him away. Hercules, as some report, carried him back to hell after he had brought him before Eurystheus.

Many other exploits are said to have been performed by Hercules ; in particular, he accompanied the Argonauts to Colchis before he delivered himself up to the king of Mycenæ. He assisted the gods in their wars against the giants, and it was through him alone that Jupiter obtained a victory. He conquered Laomedon, and pillaged Troy. When Iole, the daughter of Eurytus king of Cœchalia, of whom he was deeply ena-

moured, was refused to his entreaties, he became the prey of a second fit of insanity, and he murdered Iphytus, the only one of the sons of Eurytus who favoured his addresses to Iole. He was some time after purified of the murder, and his insanity ceased; but the gods persecuted him, and he was visited by a disorder which obliged him to apply to the oracle of Delphi for relief. The coldness with which the Pythia received him irritated him, and he resolved to plunder Apollo's temple and carry away the sacred tripod. Apollo opposed him, and a severe conflict was begun, which nothing but the interference of Jupiter with his thunderbolts could have prevented. He was upon this told by the oracle that he must be sold as a slave, and remain three years in the most abject servitude to recover from his disorder. He complied; and Mercury, by order of Jupiter, conducted him to Omphale, queen of Lydia, to whom he was sold as a slave. Here he cleared all the country from robbers; and Omphale, who was astonished at the greatness of his exploits, married him. Hercules had Agelaus and Lamon by Omphale, from whom Cræsus king of Lydia was descended. He became also enamoured of one of Omphale's female servants, by whom he had Alceus. After he had completed the years of his slavery, he returned to Peloponnesus, where he re-established on the throne of Sparta Tyndarus, who had been expelled by Hippocoon. He became one of Dejanira's suitors, and married her after he had overcome all his rivals. He was obliged to leave Calydon his father-in-law's kingdom, because he had inadvertently killed a man with a blow of his fist; and it was on account of this expulsion that he was not present at the hunting of the Calydonian boar. From Calydon he retired to the court of Ceyx king of Trachinia. The king received him and his wife with great marks of friendship, and purified him of the murder which he had committed at Calydon. Hercules was still mindful that he had once been refused the hand of Iole; he therefore made war against her father Eurytus, and killed him with three of his sons. Iole fell into the hands of her father's murderer, and found that she was loved by Hercules as much as before. She accompanied him on mount Cæta, where he was going to raise an altar and offer a solemn sacrifice to Jupiter. As he had not then the shirt and tunic in which he arrayed himself to offer a sacrifice, he sent Lichas to Trachin to his wife Dejanira, in order to provide himself a proper dress. Dejanira had some time before been attempted by the Centaur Nessus, as he was ferrying her over the river Euenus; and Hercules beholding it from the shore, had given him a mortal wound with an arrow. The monster finding himself dying, advised her to mix some oil with the blood which flowed from his wound, and to anoint her husband's shirt with it, pretending that it would infallibly secure him from loving any other woman; and she, too well apprized of his inconstancy, had actually prepared the poisoned ointment accordingly. Lychas coming to her for the garments, unfortunately acquainted her with his having brought away Iole; upon which she, in a fit of jealousy, anointed his shirt with the fatal mixture. This had no sooner touched his body, than he felt the poison diffuse itself through all his veins; the violent pain of which caused him to disband his army, and to return to Trachin. His torment still increasing, he sent to consult the oracle for a cure; and was answered, that he should cause himself to be conveyed to mount Cæta, and there rear up a great pile of wood, and leave the rest to Jupiter. By the time he had obeyed the oracle, his pains being become intolerable, he dressed himself in his martial habit, flung himself upon the pile, and desired the bystanders to set fire to it. Others say that he left the charge of it to his son Philoctetes; who having performed his father's command, had his bow and arrows given him as a reward for his obedience. At the same time Jupiter, to be as good as his word, sent a flash of light-

ning, which consumed both the pile and the hero; insomuch that Iolæus, coming to take up his bones, found nothing but ashes: from which they concluded, that he was passed from earth to heaven, and joined to the gods. His friends showed their gratitude to his memory by raising an altar where the burning pile had stood. Menætiæ the son of Actor offered him a sacrifice of a bull, a wild boar, and a goat, and enjoined the people of Opus yearly to observe the same religious ceremonies. His worship soon became as universal as his fame; and Juno, who had once persecuted him with such fury, forgot her resentment, and gave him her daughter Hebe in marriage. Hercules has received many surnames and epithets, either from the place where his worship was established, or from the labours which he achieved. His temples were numerous and magnificent, and his divinity revered. No dogs or flies ever entered his temple at Rome: and that of Gades, according to Strabo, was always forbidden to women and pigs. The Phœnicians offered quails on his altars; and as it was supposed that he presided over dreams, the sick and infirm were sent to sleep in his temples, that they might receive in their dreams the agreeable presages of their approaching recovery. The white poplar was particularly dedicated to his service.

It is observed, that there are none even of the twelve great gods of antiquity that have so many ancient monuments relating to them as Hercules. The famous statue of Hercules, in the Farnese palace at Rome, is well known to the connoisseurs: this represents him resting after the last of his twelve labours above recited, leaning on his club, and holding the apples of the Hesperides in his hand. In this statue, as in all the other figures of him, he is formed, by the breadth of his shoulders, the spaciousness of his chest, the largeness of his size, and the firmness of his muscles, to express strength and a capacity of enduring great fatigue, which constituted the chief idea of virtue among the ancient heathens. His other attributes are his lion's skin, his club, and his bow. Hercules is represented by the ancients as an exemplar of virtue: however, the *Hercules bibax*, or drunken Hercules, is no uncommon figure; and his amours are described both by the poets and artists. Thus, the Cupids are made to take away his club, and he is exhibited in the posture of bending under a little boy; by which actions we perceive, that he who conquered all difficulties was a slave to love. His children are as numerous as the labours and difficulties which he underwent; and indeed they became so powerful soon after his death, that they alone had the courage to invade all Peloponnesus. See HERACLIDÆ.

The apotheosis of Hercules, or the establishment of his altars in the principal cities of Greece, is fixed by Thrasylbulus 29 years before the taking of Troy.

Hercules has been particularly honoured by the Greeks under the name of *Musagetes*, "the conductor of the Muses;" and at Rome under that of *Hercules Musarum*. He is represented on medals with a lyre in his hand; and the reverse is marked with the figure of the nine Muses, with their proper symbols.

HERCULES, in astronomy, one of the constellations of the northern hemisphere. The stars in the constellation Hercules in Ptolemy's catalogue are 29; in Tycho's 28; in the British catalogue 113.

HERCULES'S *Pillars*, in antiquity, a name given to two lofty mountains, situated one on the most southern extremity of Spain, and the other on the opposite part of Africa. They were called by the ancients *Abyla* and *Culpe*. They are reckoned the boundaries of the labours of Hercules; and, according to ancient tradition, they were joined together till they were severed by the arm of the hero, and a communication opened between the Mediterranean and Atlantic seas.

HERCYNIA SILVA, in ancient geography, the largest of

forests. Its breadth was a journey of nine days to the best traveller. Taking its rise at the limits of the Helvetii, Nemetes, and Rauraci, it ran along the Danube to the borders of the Daci and Anartes, a length of 60 days journey, according to Cæsar, who appears to have been well acquainted with its true breadth, seeing it occupied all Lower Germany. It may therefore be considered as covering the whole of Germany; and most of the other forests may be considered as parts of it, though distinguished by particular names: consequently the Hartz, in the duchy of Brunswick, which gave name to the whole, may be considered as one of its parts. The name *Hartz* denotes "refinous," or "pine-trees." By the Greeks it is called *Orcynius*, as a name common to all the forests in Germany; in the same manner as *Hercynius* was the name given by the Romans; and both from the German *Hartz*.

HERD, among hunters, an assemblage of black or fallow beasts, in contradistinction to *flock*. See *FLOCK*. In the hunting language there are various terms used for companies of the different kinds of game. We say a *herd* of harts or bucks, a *bevy* of roes, a *rout* of wolves, a *riches* of martens, &c.

HEREDITAMENTS, whatever moveable things a person may have to himself and his heirs by way of inheritance; and which, if not otherwise bequeathed, descend to him who is next heir, and not to the executor as chattels do.

HEREDITARY, an appellation given to whatever belongs to a family by right of succession from heir to heir. The term *hereditary* is also figuratively applied to good or ill qualities, either of body or mind, supposed to be transmitted from father to son: thus we say virtue and piety are hereditary qualities in such a family; that in Italy the hatred of families is hereditary; and that the gout, king's evil, madness, &c. are hereditary diseases.

HEREDITARY *Right*, in the British constitution. The grand fundamental maxim upon which the *jus coronæ*, or right of succession to the throne of Britain depends, Sir William Blackstone takes to be this: That the crown is, by common law and constitutional custom, hereditary; and this in a manner peculiar to itself: but that the right of inheritance may from time to time be changed or limited by act of parliament; under which limitations the crown still continues hereditary.

1. The crown is in general hereditary, or descendible to the next heir, on the death or demise of the last proprietor. All regal governments must be either hereditary or elective: and as there is no instance wherein the crown of England has ever been asserted to be elective, except by the regicides on the occasion of the unparalleled trial of king Charles I. it must of consequence be hereditary. Yet in thus asserting an hereditary right, a *jure divino* title to the throne is by no means intended. Such a title may be allowed to have subsisted under the theocratic establishments of the children of Israel in Palestine: but it never yet subsisted in any other country; save only so far as kingdoms, like other human fabrics, are subjected to the general and ordinary dispensations of Providence. Nor indeed have a *jure divino* and an hereditary right any necessary connection with each other; as some have very weakly imagined. The titles of David and Jehu were equally *jure divino* as those of either Solomon or Ahab; and yet David slew the sons of his predecessor, and Jehu his predecessor himself. And when our kings have the same warrant as they had, whether it be to sit upon the throne of their fathers, or to destroy the house of the preceding sovereign, they will then, and not before, possess the crown of England by a right like theirs, immediately derived from heaven. The hereditary right, which the laws of England acknowledge, owes its origin to the founders of our constitution, and to them only. It has no relation to, nor de-

pends upon, the civil laws of the Jews, the Greeks, the Romans, or any other nation upon earth; the municipal laws of one society having no connection with, or influence upon, the fundamental polity of another. The founders of our English monarchy might perhaps, if they had thought proper, have made it an elective monarchy; but they rather chose, and upon good reason, to establish originally a succession by inheritance. This has been acquiesced in by general consent, and ripened by degrees into common law: the very same title that every private man has to his own estate. Lands are not naturally descendible, any more than thrones: but the law has thought proper, for the benefit and peace of the public, to establish hereditary succession in the one as well as the other.

It must be owned, an elective monarchy seems to be the most obvious, and best suited of any to the rational principles of government, and the freedom of human nature: and accordingly we find from history, that, in the infancy and first rudiments of almost every state, the leader, chief magistrate, or prince, hath usually been elective. And, if the individuals who compose that state could always continue true to first principles, uninfluenced by passion or prejudice, unassailed by corruption, and unawed by violence, elective succession were as much to be desired in a kingdom as in other inferior communities. The best, the wisest, and the bravest man, would then be sure of receiving that crown which his endowments have merited; and the sense of an unbiassed majority would be dutifully acquiesced in by the few who were of different opinions. But history and observation will inform us, that elections of every kind (in the present state of human nature) are too frequently brought about by influence, partiality, and artifice: and, even where the case is otherwise, these practices will be often suspected, and as constantly charged upon the successful, by a splanetic disappointed minority. This is an evil to which all societies are liable; as well those of a private and domestic kind, as the great community of the public, which regulates and includes the rest. But in the former there is this advantage, That such suspicions, if false, proceed no farther than jealousies and murmurs, which time will effectually suppress; and, if true, the injustice may be remedied by legal means, by an appeal to those tribunals to which every member of society has (by becoming such) virtually engaged to submit. Whereas, in the great and independent society, which every nation composes, there is no superior to resort to but the law of nature; no method to redress the infringements of that law, but the actual exertion of private force. As therefore between two nations, complaining of mutual injuries, the quarrel can only be decided by the law of arms; so in one and the same nation, when the fundamental principles of their common union are supposed to be invaded, and more especially when the appointment of their chief magistrate is alleged to be unduly made, the only tribunal to which the complainants can appeal is that of the God of battles, the only process by which the appeal can be carried on is that of a civil and intestine war. An hereditary succession to the crown is therefore now established, in this and most other countries, in order to prevent that periodical bloodshed and misery, which the history of ancient imperial Rome, and the more modern experience of Poland and Germany, may show us are the consequences of elective kingdoms.

2. But, secondly, as to the particular mode of inheritance. It in general corresponds with the feudal path of descents, chalked out by the common law in the succession to landed estates; yet with one or two material exceptions. Like them, the crown will descend lineally to the issue of the reigning monarch; as it did from king John to Richard II. through a regular pedigree of six lineal generations: as in them the preference of males to females, and the right of primogeniture among the males, are strictly adhered to. Thus Edward V,

succeeded to the crown, in preference to Richard his younger brother, and Elizabeth his elder sister. Like them, on failure of the male line, it descends to the issue female; according to the ancient British custom remarked by Tacitus, *Solent fœminarum ductu bellare, et sexum in imperiis non discernere*. Thus Mary I. succeeded to Edward VI.; and the line of Margaret queen of Scots, the daughter of Henry VII. succeeded, on failure of the line of Henry VIII. his son. But among the females, the crown descends by right of primogeniture to the eldest daughter only and her issue; and not, as in common inheritances, to all the daughters at once; the evident necessity of a sole succession to the throne having occasioned the royal law of descents to depart from the common law in this respect: and therefore queen Mary, on the death of her brother, succeeded to the crown alone, and not in partnership with her sister Elizabeth. Again, the doctrine of representation prevails in the descent of the crown, as it does in other inheritances; whereby the lineal descendants of any person deceased stand in the same place as their ancestor, if living, would have done. Thus Richard II. succeeded his grandfather Edward III. in right of his father the Black Prince; to the exclusion of all his uncles, his grandfather's younger children. Lastly, on failure of lineal descendants, the crown goes to the next collateral relations of the late king; provided they are lineally descended from the blood-royal, that is, from that royal stock which originally acquired the crown. Thus Henry I. succeeded to William II. John to Richard I. and James I. to Elizabeth; being all derived from the Conqueror, who was then the only regal stock. But herein there is no objection (as in the case of common descents) to the succession of a brother, an uncle, or other collateral relation, of the half-blood; that is, where the relationship proceeds not from the same couple of ancestors (which constitutes a kinsman of the whole blood), but from a single ancestor only; as when two persons are derived from the same father, and not from the same mother, or *vice versa*: provided only, that the one ancestor, from whom both are descended, be that from whose veins the blood-royal is communicated to each. Thus Mary I. inherited to Edward VI. and Elizabeth inherited to Mary; all born of the same father, king Henry VIII. but all by different mothers. See the articles CONSANGUINITY, DESCENT, and SUCCESSION.

3. The doctrine of hereditary right does by no means imply an indefeasible right to the throne. No man will assert this, who has considered our laws, constitution, and history, without prejudice, and with any degree of attention. It is unquestionably in the breast of the supreme legislative authority of this kingdom, the king and both houses of parliament, to defeat this hereditary right; and, by particular entails, limitations, and provisions, to exclude the immediate heir, and vest the inheritance in any one else. This is strictly consonant to our laws and constitution; as may be gathered from the expression so frequently used in our statute-book, of "the king's majesty, his heirs, and successors." In which we may observe, that as the word heirs necessarily implies an inheritance or hereditary right generally subsisting in the royal person; so the word *successors*, distinctly taken, must imply that this inheritance may sometimes be broken through; or, that there may be a successor, without being the heir of the king. And this is so extremely reasonable, that without such a power, lodged somewhere, our polity would be very defective. For, let us barely suppose so melancholy a case, as that the heir-apparent should be a lunatic, an idiot, or otherwise incapable of reigning; how miserable would the condition of the nation be, if he were also incapable of being set aside! It is therefore necessary that this power should be lodged somewhere; and yet the inheritance and regal dignity would be very precarious indeed, if this power were expressly and avowedly lodged in the

hands of the subject only, to be exerted whenever prejudice, caprice, or discontent, should happen to take the lead. Consequently it can no where be so properly lodged as in the two houses of parliament, by and with the consent of the reigning king; who, it is not to be supposed, will agree to any thing improperly prejudicial to the rights of his own descendants. And therefore in the king, lords, and commons, in parliament assembled, our laws have expressly lodged it.

4. But, fourthly, However the crown may be limited or transferred, it still retains its descendible quality, and becomes hereditary in the wearer of it. And hence in our law the king is said never to die in his political capacity; though, in common with other men, he is subject to mortality in his natural: because immediately upon the natural death of Henry, William, or Edward, the king survives in his successor. For the right of the crown vests, *eo instanti*, upon his heir; either the *heres natus*, if the course of descent remains unimpeached, or the *heres factus*, if the inheritance be under any particular settlement. So that there can be no interregnum; but, as Sir Matthew Hale observes, the right of sovereignty is fully invested in the successor by the very descent of the crown. And therefore, however acquired, it becomes in him absolutely hereditary, unless by the rules of the limitation it is otherwise ordered and determined: In the same manner as landed estates, to continue our former comparison, are by the law hereditary, or descendible to the heirs of the owner; but still there exists a power, by which the property of those lands may be transferred to another person. If this transfer be made simply and absolutely, the lands will be hereditary in the new owner, and descend to his heir at law: but if the transfer be clogged with any limitations, conditions, or entails, the lands must descend in that channel, so limited and prescribed, and no other. See SUCCESSION.

HEREFORD, the capital of Herefordshire, with a market on Wednesday, Friday, and Saturday. It is almost encompassed by the Wye and two other rivers, over which are two bridges. It is an ancient decayed place, and had six parish-churches, but two of them were demolished in the civil wars. It is a bishop's see; and the cathedral is an ancient and venerable structure. The west tower, in particular, was esteemed a beautiful and magnificent piece of architecture: it was 125 feet high, and was built, in the 12th century, by Giles de Bruce, then bishop of Hereford; but, in April 1786, the whole of this tower, with a part of the body of the church, fell down. A subscription, however, having been set on foot, this tower has been since rebuilt. The chief manufacture is gloves. It is governed by a mayor, six aldermen, and a sword-bearer; and is 24 miles W. N. W. of Gloucester, and 130 W. N. W. of London. W. lon. 2. 35. N. lat. 52. 4.

HEREFORDSHIRE, a county of England, bounded on the E. by Gloucestershire and Worcestershire, on the W. by Radnorshire and Brecknockshire, on the N. by Shropshire, and on the S. by Monmouthshire. It extends 35 miles from N. to S. and 47 from E. to W. It is divided into 11 hundreds; contains one city, eight market towns, and 176 parishes; and sends eight members to parliament. The air is healthy and delightful; and the inhabitants generally live to a great age. The soil is exceedingly rich, producing excellent corn, wool, and fruit, as is evident from the Leominster bread, Weobly ale, and Herefordshire cider; the last of which is sent to all parts of England. The apples producing the cider grow in greater abundance here than in any other county, being plentiful even in the hedge-rows. Of these are various kinds, yielding liquors of different strength and qualities. The most celebrated is the redstreak, which is said to be peculiar to this county. The Styer cider is remarkable for a superior strength

and body, and for keeping very well. The sheep of Herefordshire are small, affording a fine silky wool, in quality approaching to the Spanish. The principal rivers are the Wye, Mynnow, and Lug; all which are well stored with fish. The salmon of this county are very remarkable; for, in other parts of England, they are so far out of season, after spawning, as to be unwholesome food, till they have been again at sea to recover themselves; but here they are always sound, fat, and fit for the table.

HERENHAUSEN, a palace of Germany near Hanover, belonging to the king of Great Britain. Here are lodgings for all the court; and a garden of vast extent, in which are fine water-works, a labyrinth, and many other curiosities worthy the observation of a traveller.

HERENTHALS, a town of Austrian Brabant, seated on the river Nethe, 20 miles N. E. of Louvain. E. lon. 4. 54. N. lat. 51. 13.

HERESY, in law, an offence against Christianity, consisting in a denial of some of its essential doctrines, publicly and obstinately avowed; being defined, "*sententia rerum divinarum humano sensu excogitata, palam docta et pertinaciter defensa.*" And here it must be acknowledged that particular modes of belief or unbelief, not tending to overturn Christianity itself, or to sap the foundations of morality, are by no means the object of coercion by the civil magistrate. What doctrines shall therefore be adjudged heresy, was left by our old constitution to the determination of the ecclesiastical judge; who had herein a most arbitrary latitude allowed him. For the general definition of an heretic given by Lyndewode, extends to the smallest deviations from the doctrines of the holy church: "*hereticus est qui dubitat de fide catholica, et qui negligit servare ea, quæ Romana ecclesia statuit, seu servare decreverat.*" Or, as the statute 2 Hen. IV. c. 15. expresses it in English, "teachers of erroneous opinions, contrary to the faith and blessed determinations of the holy church." Very contrary this to the usage of the first general councils, which defined all heretical doctrines with the utmost precision and exactness. And what ought to have alleviated the punishment, the uncertainty of the crime, seems to have enhanced it in those days of blind zeal and pious cruelty. It is true that the sanctimonious hypocrisy of the canonists went at first no farther than enjoining penance, excommunication, and ecclesiastical deprivation, for heresy; though afterwards they proceeded boldly to imprisonment by the ordinary, and confiscation of goods *in pios usus*. But in the mean time they had prevailed upon the weakness of bigoted princes to make the civil power subservient to their purposes, by making heresy not only a temporal, but even a capital, offence: the Romish ecclesiastics determining, without appeal, whatever they pleased to be heresy, and shifting off to the secular arm the odium and drudgery of executions; with which they themselves were too tender and delicate to intermeddle. Nay, they pretended to intercede and pray, on behalf of the convicted heretic, *ut citra mortis periculum sententiæ circa eum moderetur*: well knowing that at the same time they were delivering the unhappy victim to certain death. Hence the capital punishments inflicted on the ancient Donatists and Manichæans by the emperors Theodosius and Justinian: hence also the constitution of the emperor Frederic mentioned by Lyndewode, adjudging all persons without distinction to be burnt with fire who were convicted of heresy by the ecclesiastical judge. The same emperor, in another constitution, ordained, that if any temporal lord, when admonished by the church, should neglect to clear his territories of heretics within a year, it should be lawful for good catholics to seize and occupy the lands, and utterly to exterminate the heretical possessors. And upon this foundation was built that arbitrary power, so long claimed and so fatally exerted by the Pope, of disposing even of the king-

doms of refractory princes to more dutiful sons of the church. The immediate event of this constitution was something singular, and may serve to illustrate at once the gratitude of the holy see, and the just punishment of the royal bigot; for, upon the authority of this very constitution, the pope afterwards expelled this very emperor Frederic from his kingdom of Sicily, and gave it to Charles of Anjou.

Christianity being thus deformed by the dæmon of persecution upon the continent, we cannot expect that our own island should be entirely free from the same scourge. And therefore we find among our ancient precedents a writ *de heretico comburendo*, which is thought by some to be as ancient as the common law itself. However, it appears from thence, that the conviction of heresy by the common law was not in any petty ecclesiastical court, but before the archbishop himself in a provincial synod; and that the delinquent was delivered over to the king to do as he should please with him: so that the crown had a controul over the spiritual power, and might pardon the convict by issuing no process against him; the writ *de heretico comburendo* being not a writ of course, but issuing only by the special direction of the king in council.

But in the reign of Henry IV. when the eyes of the Christian world began to open, and the seeds of the Protestant religion (though under the opprobrious name of *lollardy*) took root in this kingdom; the clergy, taking advantage from the king's dubious title to demand an increase of their own power, obtained an act of parliament, which sharpened the edge of persecution to its utmost keenness. For, by that statute, the diocesan alone, without the intervention of a synod, might convict of heretical tenets; and unless the convict abjured his opinions, or if after abjuration he relapsed, the sheriff was bound *ex officio*, if required by the bishop, to commit the unhappy victim to the flames, without waiting for the consent of the crown. By the statute 2 Hen. V. c. 7. *lollardy* was also made a temporal offence, and indictable in the king's courts; which did not thereby gain an exclusive, but only a concurrent, jurisdiction with the bishop's consistory.

Afterwards, when the final reformation of religion began to advance, the power of the ecclesiastics was somewhat moderated; for though what heresy *is*, was not then precisely defined, yet we are told in some points what it *is not*: the statute 25 Hen. VIII. c. 14. declaring that offences against the see of Rome are not heresy; and the ordinary being thereby restrained from proceeding in any case upon mere suspicion; that is, unless the party be accused by two credible witnesses, or an indictment of heresy be first previously found in the king's courts of common law. And yet the spirit of persecution was not yet abated, but only diverted into a lay channel. For in six years afterwards, by statute 31 Hen. VIII. c. 14. the bloody law of the six articles was made, which established the six most contested points of popery, transubstantiation, communion in one kind, the celibacy of the clergy, monastic vows, the sacrifice of the mass, and auricular confession; which points were "determined and resolved by the most godly study, pain, and travail of his majesty: for which his most humble and obedient subjects, the lords *spiritual* and temporal, and the commons, in parliament assembled, did not only render and give unto his highness their most high and hearty thanks;" but did also enact and declare all oppugners of the first to be heretics, and to be burnt with fire; and of the five last to be felons, and to suffer death. The same statute established a new and mixed jurisdiction of clergy and laity for the trial and conviction of heretics; the reigning prince being then equally intent on destroying the supremacy of the bishops of Rome, and establishing all other their corruptions of the Christian religion.

Without perplexing this detail with the various repeals and

revivals of these sanguinary laws in the two succeeding reigns, let us proceed to the reign of queen Elizabeth; when the reformation was finally established with temper and decency, unfulfilled with party-rancour, or personal caprice and resentment. By statute 1 Eliz. c. 1. all former statutes relating to heresy are repealed, which leaves the jurisdiction of heresy as it stood at common law; viz. as to the infliction of common censures, in the ecclesiastical courts; and in case of burning the heretic, in the provincial synod only. Sir Matthew Hale is indeed of a different opinion, and holds that such power resided in the diocesan also; though he agrees, that in either case the writ *de heretico comburendo* was not demandable of common right, but grantable or otherwise merely at the king's discretion. But the principal point now gained was, that by this statute a boundary is for the first time set to what shall be accounted heresy; nothing for the future being to be so determined, but only such tenets, which have been heretofore so declared, 1. by the words of the canonical scriptures; 2. by the first four general councils, or such others as have only used the words of the holy Scriptures; or, 3. which shall hereafter be so declared by the parliament, with the assent of the clergy in convocation. Thus was heresy reduced to a greater certainty than before; though it might not have been the worse to have defined it in terms still more precise and particular: as a man continued still liable to be burnt, for what perhaps he did not understand to be heresy, till the ecclesiastical judge so interpreted the words of the canonical scriptures.

For the writ *de heretico comburendo* remained still in force; and we have instances of its being put in execution upon two Anabaptists in the seventeenth of Elizabeth, and two Arians in the ninth of James I. But it was totally abolished, and heresy again subjected only to ecclesiastical correction, *pro salute animæ*, by virtue of the statute 29 Car. II. c. 9.: for, in one and the same reign, our lands were delivered from the slavery of military tenures; our bodies from arbitrary imprisonment by the *habeas corpus* act; and our minds from the tyranny of superstitious bigotry, by demolishing this last badge of persecution in the English law.

Everything is now less exceptionable, with respect to the spiritual cognizance, and spiritual punishment of heresy: unless perhaps that the crime ought to be more strictly defined, and no prosecution permitted, even in the ecclesiastical courts, till the tenets in question are by proper authority previously declared to be heretical. Under these restrictions, some think it necessary for the support of the national religion, that the officers of the church should have power to censure heretics; yet not to harass them with temporal penalties, much less to exterminate or destroy them. The legislature hath indeed thought it proper, that the civil magistrate should again interpose, with regard to one species of heresy, very prevalent in modern times; for by statute 9 and 10 W. III. c. 32. if any person educated in the Christian religion, or professing the same, shall by writing, printing, teaching, or advised speaking, deny any one of the persons in the holy Trinity to be God, or maintain that there are more gods than one, he shall undergo the same penalties and incapacities which were just now mentioned to be inflicted on apostacy by the same statute.

HERETIC, a general name for all such persons under any religion, but especially the Christian, as profess or teach religious opinions contrary to the established faith, or to what is made the standard of orthodoxy. See HERESY.

HERETOCHS, among our Saxon ancestors, signified the same with dukes or duces, denoting the commanders or leaders of their armies. It appears, from Edward the Confessor's laws, that the military force of this kingdom was in the hands of the dukes or heretochs, who were constituted through every province and county in the kingdom, being selected out of the

principal nobility, and such as were most remarkable for being *sapientes, fideles, & animosi*. Their duty was to lead and regulate the English armies, with a very unlimited power; and because of their great power, they were elected by the people in their full assembly, or folk-mote, in the same manner as sheriffs were elected.

HERFORDEN, or HERWARDEN, a free imperial town of Germany, in the circle of Westphalia, capital of the county of Ravensburgh, with a famous nunnery, belonging to the protestants of the confession of Augsburg, whose abbess is a princess of the empire, and has a voice and place in the diet. It is seated on the river Aa, 17 miles S. W. of Minden. E. lon. 8. 47. N. lat. 52. 9.

HERGRUNDT, a town of Upper Hungary, remarkable for its mines of vitriol, which are extremely rich. Those who work in the mines have built a subterraneous town, with a great number of inhabitants. It is 65 miles N. of Buda. E. lon. 18. 15. N. lat. 48. 30.

HERI, a pleasant island in the Indian Ocean, two miles N. N. W. of Ternate. It is pretty high, and not more than two miles in circumference. The cultivated parts, contrasted with the brown shade of the trees, and the interspersed situation of the houses, give this little spot a very picturesque appearance. It appears, as well as Ternate, to be in a perfect state of cultivation, and to be well inhabited.

HERIOT, in law, a customary tribute of goods and chattels, payable to the lord of the fee on the decease of the owner of the land. See TENURE. *Heriot* is of two sorts, viz. 1. *Heriot-custum*, where heriots have been paid time out of mind by custom, after the death of a tenant for life. In some places, there is a customary composition in money, as 10 or 20 shillings in lieu of a heriot, by which the lord and tenant are both bound, if it be an indisputably ancient custom: but a new composition of this sort will not bind the representatives of either party. 2. *Heriot-service*, when a tenant holds by such service to pay heriot at the time of his death; which service is expressed in the deed of feoffment. For this latter the lord shall distrain; and for the other he shall seize, and not distrain. If the lord purchase part of the tenancy, heriot-service is extinguished; but it is not so of heriot-custum.

HERISSON, in fortification, a beam armed with a great number of iron spikes with their points outwards, and supported by a pivot on which it turns. These serve as a barrier to block up any passage, and are frequently placed before the gates, and more especially the wicket-doors, of a town or fortress, to secure those passages which must of necessity be often opened and shut.

HERISHAW, an ancient town of Switzerland, the most considerable possessed by the protestants in the canton of Appenzel. It is seated on the river Bulbach.

HERK, a town of Germany, in the bishopric of Liege, seated on a river of the same name, near its confluence with the Demer, two miles W. of Maestricht. E. lon. 5. 38. N. lat. 50. 52.

HERMÆA, in antiquity, ancient Greek festivals in honour of the god Hermes or Mercury. One of these was celebrated by the Phlegæatæ in Arcadia; a second by the Cyllenians in Elis; and a third by the Tanagræans, where Mercury was represented with a ram upon his shoulder, because he was said to have walked through the city in that posture in time of a plague, and to have cured the sick; in memory of which, it was customary at this festival for one of the most beautiful youths in the city to walk round the walls with a ram upon his shoulder. A fourth festival of the same name was observed in Crete, when it was usual for the servants to sit down at the table while their masters waited; a custom which was also observed at the Roman Saturnalia.

HERMAN (Paul), a famous botanist in the 17th century, was born at Hall in Saxony. He practised physic in the isle of Ceylon, and was afterwards made professor of botany at Leyden, where he died in 1695. He wrote a catalogue of the plants in the public garden at Leyden, and a work intitled *Floræ Lugduno-Batavæ flores*.

HERMANN (James), a learned mathematician of the academy at Berlin, and a member of the academy of sciences at Paris, was born at Basil in 1678. He was a great traveller, and for six years was professor of mathematics at Padua. He afterwards went to Moscow, being invited thither by the Czar in 1724. At his return to his native country, he was made professor of morality and natural law at Basil; and died there in 1733. He wrote several mathematical works.

HERMANNIA, in botany; a genus of the pentandria order, belonging to the monadelphica class of plants; and in the natural method ranking under the 37th order, *Columniferae*. The capsule is quinelocular; the petals at the base are semitubulated and oblique. The *species* are, 1. The *lavendulifolia*, which hath a shrubby stalk and slender branches, very bushy, about a foot and an half high, small, spear-shaped, obtuse and hairy leaves, with clusters of small yellow flowers along the sides of the branches, continuing from June to Autumn. 2. The *althæifolia* hath a shrubby stalk, and soft woolly branches, growing two feet high, with numerous yellow flowers in loose spikes growing at the end of the branches, and making their appearance in July. 3. The *grossularifolia* hath a shrubby stalk and spreading branches, growing three or four feet high, with bright yellow flowers coming out in great numbers at the ends of all the shoots and branches in April or May. 4. The *alnifolia* hath a shrubby stalk and branches growing irregularly four or five feet high, with pale yellow flowers in short spikes from the sides and ends of the branches, appearing in April or May. 5. The *byssopifolia* hath a shrubby upright stalk, branching out laterally six or seven feet high, with pale yellow flowers in clusters from the sides of the branches, appearing in May and June. There are 14 other species. All these plants are natives of Africa, and therefore must be kept in a green-house during the winter in this country. They are propagated by cuttings of their young shoots, which may be planted in pots of rich earth any time from April to July.

HERMANSTADT, a handsome, large, populous, and strong town of Hungary, capital of Transylvania, with a bishop's see. It is seated on the river Ceben, 25 miles E. of Weissenburg, and 205 S. E. of Buda. E. lon. 24. 40. N. lat. 46. 25.

HERMANT (Godfrey), a learned doctor of the Sorbonne, born at Beauvais in 1617. He wrote many excellent works; the principal of which are, 1. The lives of St. Athanasius, St. Basil, St. Gregory Nazianzen, St. Chrysostom, and St. Ambrose. 2. Four pieces in defence of the rights of the university of Paris against the Jesuits. 3. A French translation of St. Chrysostom's treatise of Providence, and St. Basil's Ascetics. 4. Extracts from the councils; published after his death, under the title of *Clavis disciplinæ ecclesiasticæ*. He died suddenly at Paris in 1690.

HERMAPHRODITE, is generally understood to signify a human creature possessed of both sexes, or who has the parts of generation both of male and female. The term, however, is applied also to other animals, and even to plants. The word is formed of the Greek *Ἑρμαφροδίτης*, a compound of *Ἑρμης* Mercury, and *Ἀφροδίτη* Venus; *q. d.* a mixture of Mercury and Venus, *i. e.* of male and female. For it is to be observed, *Hermaphroditus* was originally a proper name, applied by the heathen mythologists to a fabulous deity, whom some represent as a son of *Hermes*, Mercury, and *Aphrodite*, Venus; and who, being desperately in love with the nymph *Salmacis*, obtained of the

gods to have his body and hers united into one. Others say, that the god *Hermaphroditus* was conceived as a composition of Mercury and Venus; to exhibit the union between eloquence, or rather commerce, whereof Mercury was god, with pleasure, whereof Venus was the proper deity. Lastly, others think this junction intended to show that Venus (pleasure) was of both sexes; as, in effect, the poet Calvus calls Venus a god; *Pollentemque Deum Venerem*. As also Virgil, *Æneid*. lib. ii.

*Discedo, ac ducente Deo flammam inter et hostes
Expedior*—————

M. Spon observes, *Hesychius* calls Venus *Aphroditos*; and *Theophrastus* affirms, that *Aphroditos*, or Venus, is *Hermaphroditus*; and that in the island of Cyprus she has a statue, which represents her with a beard like a man. The Greeks also call *hermaphrodites* *ανδρογυνοι* *androgyni*, *q. d.* men-women. See the article *ANDROGYNES*.

In a paper by Mr. Hunter, in the 69th volume of the *Philosophical Transactions*, *hermaphrodites* are divided into *natural* and *unnatural* or monstrous. The first belongs to the more simple orders of animals, of which there are a much greater number than of the more perfect. The unnatural takes place in every tribe of animals having distinct sexes, but is more common in some than in others. The human species, our author imagines, has the fewest; never having seen them in that species, nor in dogs; but in the horse, sheep, and black cattle, they are very frequent.

From Mr. Hunter's account, however, it does not appear that such a creature as a perfect hermaphrodite has ever existed. All the hermaphrodites which he had the opportunity of seeing had the appearance of females, and were generally thought such. In the horse they are very frequent; and in the most perfect of this kind he ever saw, the testicles had come down out of the abdomen into the place where the udder should have been, and appeared like an udder, not so pendulous as the scrotum in the male of such animals. There were also two nipples, of which horses have no perfect form; being blended in them with the sheath or prepuce, of which there was none here. The external female parts were exactly similar to those of a perfect female; but instead of a common-sized clitoris, there was one about five or six inches long; which, when erect, stood almost directly backwards.

A foal-af similar to the above was killed, and the following appearances were observed on dissection. The testicles were not come down as in the former, possibly because the creature was too young. It had also two nipples; but there was no penis passing round the pubes to the belly, as in the perfect male afs. The external female parts were similar to those of the she-afs. Within the entrance of the vagina was placed the clitoris; but much longer than that of a true female, being about five inches long. The vagina was open a little farther than the opening of the urethra into it, and then became obliterated; from thence, up to the fundus of the uterus, there was no canal. At the fundus of the common uterus it was hollow, or had a cavity in it, and then divided into two, viz. a right and a left, called the *horns* of the uterus, which were also pervious. Beyond the termination of the two horns were placed the ovaria, as in the true female; but the Fallopian tubes could not be found. From the broad ligaments, to the edges of which the horns of the uterus and ovaria were attached, there passed towards each groin a part similar to the round ligaments in the female, which were continued into the rings of the abdominal muscles; but with this difference, that there were continued with them a process or theca of the peritonæum, similar to the tunica vaginalis communis in the male afs; and in these thecæ were found the testicles, but no vasa deferentia could be observed passing from them.

In most species of animals, the production of hermaphrodites appears to be the effect of chance; but in the black cattle it seems to be an established principle of their propagation. It is a well-known fact, and, as far as hath yet been discovered, appears to be universal, that when a cow brings forth two calves, one of them a bull, and the other a cow to appearance, the cow is unfit for propagation, but the bull-calf becomes a very proper bull. They are known not to breed; they do not even show the least inclination for the bull, nor does the bull ever take the least notice of them. Among the country people in England, this kind of calf is called a *free-martin*; and this singularity is just as well known among the farmers as either cow or bull. When they are preserved, it is for the purposes of an ox or spayed heifer; viz. to yoke with the oxen, or fatten for the table. They are much larger than either the bull or the cow, and the horns grow longer and bigger, being very similar to those of an ox. The bellow of a free-martin is similar to that of an ox, and the meat is similar to that of the ox or spayed heifer, viz. much finer in the fibre than either the bull or cow; and they are more susceptible of growing fat with good food. By some they are supposed to exceed the ox and heifer in delicacy of taste, and bear a higher price at market; this, however, does not always hold, and Mr. Hunter gives an instance of the contrary. The Romans, who called the bull *taurus*, spoke also of *tauræ*, in the feminine gender, different from cows. Stephens observes, that it was thought they meant by this word *barren cows*, who obtained the name because they did not conceive any more than bulls. He also quotes a passage from Columella, *lib. vi. cap. 22*. "And, like the *tauræ*, which occupy the place of fertile cows, should be rejected or sent away." He likewise quotes Varro, *De re rustica*, *lib. ii. cap. 5*. "The cow which is barren is called *taura*." From which we may reasonably conjecture, that the Romans had not the idea of the circumstances of their production.

Of these creatures Mr. Hunter dissected three, and the following appearances were observed in the most perfect of them. The external parts were rather smaller than in the cow. The vagina passed on as in the cow to the opening of the urethra, and then it began to contract into a small canal, which passed on to the division of the uterus into the two horns; each horn passing along the edge of the broad ligament laterally towards the ovaria. At the termination of these horns were placed both the ovaria and testicles, both of which were nearly about the size of a small nutmeg. No Fallopian tubes could be found. To the testicles were vasa deferentia, but imperfect. The left one did not come near the testicle: the right only came close to it, but did not terminate in the body called *epididymis*. They were both pervious, and opened into the vagina near the opening of the urethra. On the posterior surface of the bladder, or between the uterus and bladder, were the two bags called the *vesiculæ seminales* in the male, but smaller than what they are in the bull: the ducts opened along with the vasa deferentia.

Concerning hermaphrodites of the human species, much has been written, and many laws enacted about them in different nations; but the existence of them is justly disputed. Dr. Parsons has given us a treatise on the subject, in which he endeavours to explode the notion as a vulgar error. According to him, all the hermaphrodites that have appeared, were only women whose clitoris from some cause or other was overgrown; and, in particular, that this was the case with an Angola woman shown at London as an hermaphrodite some time ago.

Among the reptile tribe, indeed, such as worms, snails, leeches, &c. hermaphrodites are very frequent. In the memoirs of the French academy, we have an account of this very extraordinary kind of hermaphrodites, which not only have both sexes, but do the office of both at the same time. Such are earth-worms,

round-tailed worms found in the intestines of men and horses, land-snails, and those of fresh waters, and all the sorts of leeches. And, as all these are reptiles, and without bones, M. Poupert concludes it probable, that all other insects which have these two characters are also hermaphrodites.

The method of coupling practised in this class of hermaphrodites, may be illustrated in the instance of earth-worms. These little creatures creep, two by two, out of holes proper to receive them, where they dispose their bodies in such a manner as that the head of the one is turned to the tail of the other. Being thus stretched lengthwise, a little conical button or papilla is thrust forth by each, and received into an aperture of the other. These animals, being male in one part of the body, and female in another, and the body flexible withal, M. Homberg does not think it impossible but that an earth-worm may couple with itself, and be both father and mother of its young; an observation which appears rather extravagant.

Among the insects of the soft or boneless kind, there are great numbers indeed, which are so far from being hermaphrodites, that they are of no sex at all. Of this kind are all the caterpillars, maggots, and worms, produced of the eggs of flies of all kinds: but the reason of this is plain; these are not animals in a perfect state, but disguises under which animals lurk. They have no business with the propagating of their species, but are to be transformed into animals of another kind, by the putting off their several coverings, and then only they are in their perfect state, and therefore then only show the differences of sex, which are always in the distinct animals, each being only male or female. These copulate, and their eggs produce these creatures, which show no sex till they arrive at that perfect state again.

HERMAPHRODITE Flowers, in botany. These are so called by the sexualists on account of their containing both the antheræ and stigma, the supposed organs of generation, within the same calyx and petals. Of this kind are the flowers of all the classes in Linnæus's sexual method, except the classes *monœcia* and *diœcia*; in the former of which, male and female flowers are produced on the same root; in the latter, in distinct plants from the same seed. In the class *polygamia*, there are always hermaphrodite flowers mixed with male or female, or both, either on the same or distinct roots. In the plantain-tree the flowers are all hermaphrodite; in some, however, the anthera or male organ, in others the stigma or female organ, proves abortive. The flowers in the former class are styled *female hermaphrodites*; in the latter, *male hermaphrodites*. Hermaphrodites are thus as frequent in the vegetable kingdom as they are rare and scarce in the animal one.

HERMAS, an ecclesiastical author of the first century; and, according to Origen, Eusebius, and Jerome, the same whom St. Paul salutes in the end of his epistle to the Romans. He wrote a book in Greek some time before Domitian's persecution, which happened in the year 95. This work is intitled *The Pastor*, from his representing an angel speaking to him in it under the form of a shepherd. The Greek text is lost, but a very ancient Latin version of it is still extant. Some of the fathers have considered this book as canonical. The best edition of it is that of 1698, where it is to be found among the other apostolical fathers, illustrated with the notes and corrections of Cotelærius and Le Clerc. With them it was translated into English by Archbishop Wake, the best edition of which is that of 1710.

HERMAS, in botany; a genus of the *monœcia* order, belonging to the *polygamia* class of plants. The umbel in the hermaphrodite is terminal; there is an universal involucre and partial ones. The rays of the small umbels are lobed; the central one flower-bearing; there are five petals, and as many barren stamina; the seeds are two-fold and suborbicular. In the male

the lateral umbels have universal and partial involucri; the small umbels are many-flowered; there are five petals, and five fertile stamina.

HERMES, or HERMA, among antiquaries, a sort of square or cubical figure of the god Mercury, usually made of marble, though sometimes of brass or other materials, without arms or legs, and planted by the Greeks and Romans in their cross-ways. Servius gives us the origin thereof, in his comment on the eighth book of the *Æneid*. Some shepherds, says he, having one day caught Mercury, called by the Greeks *Hermes*, asleep on a mountain, cut off his hands; from which he, as well as the mountain where the action was done, became denominated Cyllenius, from *κυλλος* maimed: and thence, adds Servius, it is that certain statues without arms are denominated *Hermeses* or *Hermæ*. But this etymology of the epithet of Cyllenius contradicts most of the other ancient authors; who derive it hence, that Mercury was born at Cyllene, a city of Elis, or even on the mountain Cyllene itself, which had been thus called before him.

Suidas gives a moral explication of this custom of making statues of Mercury without arms. The *Hermeses*, says he, were statues of stone placed at the vestibules or porches of the doors and temples at Athens; for this reason, that as Mercury was held the god of speech and of truth, square and cubical statues were peculiarly proper; having this in common with truth, that on what side soever they are viewed, they always appear the same. It must be observed, that Athens abounded more than any other place in *Hermeses*: there were abundance of very signal ones in various parts of the city, and they were indeed one of the principal ornaments of the place. They were also placed in the high roads and cross-ways, because Mercury, who was the courier of the gods, presided over the highways; whence he had his surname of Trivius, from *trivium*; and that of Viacus, from *via*.

From Suidas's account, above cited, it appears, that the *termini*, used among us in the door-cases, balconies, &c. of our buildings, take their origin from these Athenian *Hermeses*; and that it was more proper to call them *hermetes* than *termini*, because, though the Roman *termini* were square stones, whereon a head was frequently placed, yet they were rather used as land-marks and mere stones than as ornaments of building. See the articles MERCURY and THOTH.

HERMETIC, or HERMETICAL-*Art*, a name given to chemistry, on a supposition that Hermes Trismegistus was the inventor of the art, or that he excelled therein. See THOTH.

HERMETICAL *Philosophy* is that which undertakes to solve and explain all the phenomena of nature, from the three chemical principles, salt, sulphur, and mercury.

HERMETICAL *Physic*, or *Medicine*, is that system or hypothesis in the art of healing, which explains the causes of diseases, and the operations of medicine, on the principles of the hermetical philosophy, and particularly on the system of alkali and acid. It has been long exploded.

HERMETICAL *Seal*, a manner of stopping or closing glass vessels, for chemical operations, so very accurately, that nothing can exhale or escape, not even the most subtle spirits. It is performed by heating the neck of the vessel in the flame of a lamp till it be ready to melt, and then with a pair of pincers twisting it close together. This they call putting on *Hermes's seal*. There are also other ways of sealing vessels hermetically; viz. by stopping them with a plug or stopple of glass, well luted into the neck of the vessel; or, by turning another ovum philosophicum upon that wherein the matter is contained.

HERMHARPOCRATES, or HERMARPOCRATES, in antiquity, a deity, or figure of a deity, composed of Mercury and Harpocrates the god of Silence. M. Spon gives us a hermharpocrates in his *Rech. Cur. de l'Antiquité*, p. 98. fig. 15. having

wings on his feet like Mercury, and laying his finger on his mouth like Harpocrates. It is probable they might mean by this combination, that Silence is sometimes eloquent.

HERMIANI, or HERMIATITÆ, a sect of heretics in the second century, thus called from their leader Hermias. They were also denominated *Seleuciani*. One of their distinguishing tenets was, that God is corporeal. Another, that Jesus Christ did not ascend into heaven with his body, but left it in the sun.

HERMIONE, in ancient geography, a considerable city of Argolis. It was in ruins, except a few temples, in the time of Pausanias; who says that the new city was at the distance of four stadia from the promontory on which the temple of Neptune stood. It gave name to the Sinus Hermionicus, a part of the Sinus Argolicus.

HERMIT, or EREMIT, *Eremita*, a devout person retired into solitude, to be more at leisure for prayer and contemplation, and to disencumber himself of the affairs of this world. The word is formed from the Greek *ερημος*, desert or wilderness; and, according to the etymology, should rather be written *Eremit*. Paul, surnamed the *Hermit*, is usually reckoned the first hermit; though St. Jerome at the beginning of the Life of that saint says, it is not known who was the first. Some go back to John the Baptist, others to Elias: others make St. Anthony the founder of the eremitical life; but others think that he only rekindled and heightened the fervour thereof, and hold that the disciples of that saint owned St. Paul of Thebes for the first that practised it. The persecutions of Decius and Valerian are supposed to have been the occasion. Several of the ancient hermits, as St. Anthony, &c. though they lived in deserts, had yet numbers of religious accompanying them. There are also various orders and congregations of religious distinguished by the title of *hermits*; as, hermits of St. Augustine, of St. John Baptist, of St. Jerom, of St. Paul, &c.

HERMIT (Gaytier Peter the), a French officer of Amiens in Picardy, who quitted the military profession, and commenced hermit and pilgrim. Unfortunately he travelled to the Holy Land about the year 1093; and making a melancholy recital of the deplorable situation of a few Christians in that country to Pope Urban II. and at the same time enthusiastically lamenting that Infidels should be in possession of the famous city where the Author of Christianity first promulgated his sacred doctrines, Urban gave him a fatal commission to excite all Christian princes to a general war against the Turks and Saracens, the possessors of the Holy Land. See CRUSADES.

HERMITAGE properly signifies a little hut or habitation, in some desert place, where a hermit dwells. *Hermitage* is a name also popularly applied to any religious cell, built and endowed in a private and reclusé place, and thus annexed to some large abbey, of which the superior was called *bermita*.

HERMODACTYL, in the materia medica, a root brought from Turkey. It is of the shape of a heart flatted, of a white colour, compact, yet easy to cut or powder; of a viscous sweetish taste, with a light degree of acrimony. *Hermodactyls* were of great repute among the ancients as a cathartic; but those we now meet with in the shops have very little purgative virtue; Neumann declares he never found them to have any effect at all. The *hermodactyl* is the root of the *Colchicum variegatum*, according to some; others suppose it to be the root of the *Iris tuberosa*.

HERMOGENES, the first and most celebrated architect of antiquity, was, according to Vitruvius, born at Alanbada, a city in Caria. He built a temple of Diana at Magnesia; another of Bacchus at Tros; and was the inventor of several parts of Architecture. He composed a book on the subject, which is lost.

HERMOGENES *Tarsensis*, a rhetorician and orator, and who

was in every respect a prodigy. At 17 years of age he published his system of rhetoric, and at 20 his philosophic ideas: but at 25 he forgot every thing he had known. It is said, that his body being opened after his death, his heart was found of an extraordinary size, and all over hairy. He died about 168 B. C.

HERMOGENIANS, a sect of ancient heretics, denominated from their leader Hermogenes, who lived towards the close of the second century. Hermogenes established matter as his first principle; and regarding matter as the fountain of all evil, he maintained that the world, and every thing contained in it, as also the souls of men and other spirits, were formed by the Deity from an uncreated and eternal mass of corrupt matter. The opinions of Hermogenes, with regard to the origin of the world and the nature of the soul, were warmly opposed by Tertullian. The Hermogenians were divided into several branches under their respective chieftains, viz. Hermiani, Seleucians, Mate-riari, &c.

HERMON, or **AERMON**, in ancient geography, a mountain of the Amorites, called *Sanior* by the Phœnicians, and *Sanir* or *Senir* by the Amorites, on the east of Jordan. It is also called *Sion*, (Moses); but must not be confounded with the Sion of Jerusalem. By the Sidonians it was called *Scirion*; in the Vulgate, it is called *Sarion*. Joshua informs us, that it was the dominion of Og king of Bashan; which must be understood of its south side. It is never particularly mentioned by profane writers; being comprised under the appellation *Libanus*, or *Antilibanus*, with which mountain it is joined to the east. It is also called *Hermonim* plurally, Psalm xlii. 6. because it was extensive, and contained several mountains.

HERMES, in ancient geography, a river of Ionia; which rising near Dorylæum, a town of Phrygia, in a mountain sacred to Dindymene or Cybele, touched Mytia, and ran through the Regio Combusta, then through the plains of Smyrna down to the sea, carrying along with it the Pactolus, Hyllus, and other less noble rivers. Its waters were said to roll down gold, by Virgil and other poets.

HERNANDRIA, **JACK-IN-A-BOX-TREE**; a genus of the triandria order, belonging to the monœcia class of plants; and in the natural method ranking under the 38th order, *Tricocœæ*. The male calyx is tripartite; the corolla tripetalous; the female calyx is truncated, quite entire; the corolla hexapetalous; the plum hollow, and open at the mouth or upper part, with a loose kernel. The *Species* are, 1. The *sonora*, or common jack-in-a-box, is a native of both the Indies. It grows 20 or 30 feet high; and is garnished with broad peltated leaves, and monœcious flowers, succeeded by a large swollen hollow fruit formed of the calyx; having a hole or open at the end, and a hard nut within. The wind blowing into the cavity of this fruit makes a very whistling and rattling noise, whence comes the name. 2. The *ovigera* grows many feet high, garnished with large oval leaves not peltated; and monœcious flowers, succeeded by a swollen fruit open at the end, and a nut within. It is said, the *sonora* in Java affords a sure antidote against poison, if you either put its small roots on the wounds or eat them; as was discovered to Rumphius by a captive woman in the war between the people of Macassar and the Dutch in the year 1667. The soldiers of the former always carry this root about them, as a remedy against wounds with poisoned arrows. Both these plants being tender exotics, must be planted in pots of rich earth, and always kept in a hot-house; in which, notwithstanding all the care that can be taken, they seldom flower, and never grow beyond the height of common shrubs, though in the places where they are natives they arrive at the height of trees. They are propagated by seeds procured from the West Indies.

HERNE, a town of Kent, 6 miles from Canterbury, 12 from Margate, and 14 from Faversham. It formerly had a

market, and has now a fair on Easter-Tuesday. The church is a large ancient structure, with a tower of flint, and has six stalls of the cathedral kind, with divisions of the choir from the nave by a carved screen of oak. The church is 113 feet long. The stone front is very ancient. Here the great Dr. Ridley, the English martyr, was vicar. Herne has a commodious bay, frequented by colliers, &c.

HERNIA, in surgery, a descent of a portion of the intestines or omentum out of their natural place; or rather, the tumour formed by that descent, popularly called a rupture. The word is Latin, *hernia*, and originally signifies the same with *tumor scroti*, called also *ramax*. Priscian observes, that the ancient Marſi gave the appellation *hernia* to rocks; whence some will have hernias thus called *propter duritiem*, on account of their hardness. Scaliger chooses rather to derive the word from the Greek *ἔρως*, *ramus*, a branch. See **SURGERY**.

HERNIARIA, **RUPTURE-WORT**; a genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 11th order, *Sarmentaceæ*. The calyx is quinquepartite; there is no corolla; there are five barren stamens, and a monospermous capsule. There are four *species*, of which the only remarkable one is the *glabra*, or smooth rupture-wort, a native of many parts of England. It is a low trailing plant, with leaves like the smaller chickweed; the flowers come out in clusters from the side of the stalks at the joints, and are of a yellowish green colour. This plant is a little saltish and astringent. The juice is useful to take away specks in the eye. Cows, sheep, and horses, eat the plant; goats and swine refuse it.

HERNOSAND, a seaport of Sweden, on the gulph of Bothnia. E. lon. 17. 58. N. lat. 62. 38.

HERO, in Pagan mythology, a great and illustrious person, of a mortal nature, though supposed by the populace to partake of immortality, and after his death to be placed among the number of the gods. The word is formed of the Latin *heros*, and that of the Greek *ἥρως* *semi-deus*, "demi-god." The Greeks erected columns and other monuments over the tombs of their heroes, and established a kind of worship in honour of the manes both of their heroes and heroines. The Romans also raised statues in honour of their heroes; but there were six of their heroes of a superior order, and who were supposed to be admitted into the community of the twelve great gods: these were Hercules, Bacchus, Esculapius, Romulus, Castor, and Pollux. Writers have distinguished between the worship which the ancients paid to their heroes and that offered to their gods. The latter, it is said, consisted of sacrifices and libations; the former was only a kind of funeral honour, in which they celebrated their exploits, concluding the rehearsal with feasts.

HERO is also used in a more extensive sense, for a great, illustrious, and extraordinary personage; particularly in respect of valour, courage, intrepidity, and other military virtues. F. Bouhours makes this distinction between a great man and a hero, that the latter is more daring, fierce, and enterprising; and the former more prudent, thoughtful, and reserved. In this sense we properly say, Alexander was a hero, Julius Cæsar a great man. Women who evince any extraordinary heroism of character are called *Heroines*.

HERO of a poem or romance, is the principal personage, or he who has the chief part in it. Thus the hero of the Iliad is Achilles; of the Odyssey, Ulysses; of the Æneid, Æneas; of Tasso's Jerusalem, Godfrey of Bulloign; of Milton's Paradise Lost, Adam; though Mr. Dryden will have the Devil to be Milton's hero, because he gets the better of Adam, and drives him out of Paradise.

HERO, in fabulous history, a famous priestess of Venus, lived at Abydos, in a tower situated on the banks of the Hellespont.

She being beloved by Leander, who lived at Sestos on the other side of the strait, he every night swam over to visit her, being directed by a light fixed on the tower. But the light being put out in a stormy night, the youth missed his way, and was drowned; on which Hero threw herself into the sea, and perished.

HERO, the name of two celebrated Greek mathematicians; the one called the *old*, and the other the *young*, Hero. The younger was a disciple of Ctesibius. They are known by two works translated into Latin by Barocius: *Spiralium liber*, by Hero senior; and *Tractat. artis et machin. militar.* by Hero junior. They flourished about 130 and 100 B. C.

HERODIAN, an eminent Greek historian, who spent the greatest part of his life at Rome, flourished in the third century, in the reigns of Severus, Caracalla, Heliogabalus, Alexander, and Maximin. His history begins from the death of Marcus Aurelius the philosopher; and ends with the death of Balbinus and Maximin, and the beginning of the reign of Gordian. It is written in very elegant Greek; and there is an excellent translation of it into Latin, by Angelus Politianus. Herodian has been published by Henry Stephens in 4to, in 1581; by Boecler, at Strasburg, in 1662, 8vo; and by Hudson, at Oxford, in 1699, 8vo.

HERODIANS, a sect among the Jews at the time of our Saviour: mentioned Matth. xxii. 16. and Mark iii. 6.

The critics and commentators are very much divided with regard to the Herodians. St. Jerom, in his Dialogue against the Luciferians, takes the name to have been given to such as owned Herod for the Messiah; and Tertullian and Epiphanius are of the same opinion. But the same Jerom, in his Comment on St. Matthew, treats this opinion as ridiculous; and maintains, that the Pharisees gave this appellation by way of ridicule to Herod's soldiers, who paid tribute to the Romans; agreeable to which the Syrian interpreters render the word by *the domestics of Herod*, i. e. "his courtiers." M. Simon, in his notes on the 22d chapter of Matthew, advances a more probable opinion. The name *Herodian* he imagines to have been given to such as adhered to Herod's party and interest; and were for preserving the government in his family, about which were great divisions among the Jews. F. Hardouin will have the Herodians and Sadducees to have been the same. Dr. Prideaux is of opinion, that they derived their name from Herod the Great, and that they were distinguished from the other Jews by their concurrence with Herod's scheme of subjecting himself and his dominions to the Romans, and likewise by complying with many of their heathen usages and customs. This symbolizing with idolatry upon views of interest and worldly policy, was probably that leaven of Herod, against which our Saviour cautioned his disciples. It is farther probable, that they were chiefly of the sect of Sadducees; because the leaven of Herod is also denominated the leaven of the Sadducees.

HERODOTUS, an ancient Greek historian of Halicarnassus in Caria, son of Lyxus and Dryo, was born in the first year of the 74th Olympiad, that is, about 484 B. C. The city of Halicarnassus being at that time under the tyranny of Lygdamis, grandson of Artemisia queen of Caria, Herodotus quitted his country and retired to Samos; from whence he travelled over Egypt, Greece, Italy, &c. and in his travels acquired the knowledge of the history and origin of many nations. He then began to digest the materials he had collected into order, and composed that history which has preserved his name among men ever since. He wrote it in the isle of Samos, according to the general opinion. Lucian informs us, that when Herodotus left Caria to go into Greece, he began to consider with himself,

What he should do to be for ever known,
And make the age to come his own,

in the most expeditious way, and with as little trouble as possible. His history, he presumed, would easily procure him fame, and raise his name among the Grecians, in whose favour it was written: but then he foresaw that it would be very tedious to go through the several cities of Greece, and recite it to each respective city; to the Athenians, Corinthians, Argives, Lacedemonians, &c. He thought it most proper therefore to take the opportunity of their assembling all together; and accordingly recited his work at the Olympic games, which rendered him more famous than even those who had obtained the prizes. None were ignorant of his name, nor was there a single person in Greece who had not seen him at the Olympic games, or heard those speak of him who had seen him there.

His work is divided into nine books; which, according to the computation of Dionysius Halicarnassensis, contain the most remarkable occurrences within a period of 240 years; from the reign of Cyrus the first king of Persia, to that of Xerxes when the historian was living. These nine books are called after the names of the nine muses, each book being distinguished by the name of a muse; and this has given birth to two disquisitions among the learned: 1. Whether they were so called by Herodotus himself; and, 2. For what reason they were so called. As to the first, it is generally agreed that Herodotus did not impose these names himself; but it is not agreed why they were imposed by others. Lucian tells us, that these names were given them by the Grecians at the Olympic games, when they were first recited, as the best compliment that could be paid the man who had taken pains to do them so much honour. Others have thought that the names of the *muses* have been fixed upon them by way of reproach; and were designed to intimate, that Herodotus, instead of true history, had written a great deal of fable. But, be this as it will, it is certain, that with regard to the truth of his history, he is accused by several authors; and, on the other hand, he has not wanted persons to defend him. Aldus Manutius, Joachim Camerarius, and Henry Stephens, have written apologies for him; and, among other things, have very justly observed, that he seldom relates any thing of doubtful credit without producing the authority on which his narration is founded; and, if he has no certain authority to fix it upon, uses always the terms *ut ferunt*, *ut ego audiui*, &c.

There is ascribed also to Herodotus, but falsely, a Life of Homer, which is usually printed at the end of his work. He wrote in the Ionic dialect, and his style and manner have ever been admired by all people of taste. There have been several editions of the works of this historian; two by Henry Stephens, one in 1570, and the other in 1592; one by Gale at London in 1679; and one by Gronovius at Leyden in 1715, which is the last and best, though not the best printed.

HEROIC, something belonging to a hero, or heroine. Thus we say, *heroic actions*, *heroic virtue*, *heroic style*, *heroic verse*, *heroic poet*, *heroic age*, &c.

HEROIC Age, is that age or period of the world wherein the *heroes*, or those called by the poets the *children of the gods*, are supposed to have lived. The heroic age coincides with the fabulous age.

HEROIC Poem is that which undertakes to describe some extraordinary action, or enterprise. Homer, Virgil, Statius, and Lucan, Tasso, Camoens, Milton, and Voltaire, have composed *heroic poems*. In this sense, *heroic poem* coincides with *epic poem*.

HEROIC Verse, is that wherein heroic poems are usually composed; or, it is that proper for such poems. In the Greek and Latin, hexameter verses are peculiarly denominated *heroic verses*, as being alone used by Homer, Virgil, &c. Alexandrine verses, of 12 syllables, were formerly called *heroic verses*, as being supposed the only verse proper for heroic poetry; but later writers use verses of ten syllables.

HERON, in ornithology. See **ARDEA**. This bird is a very great devourer of fish, and will do more mischief to a pond than even an otter. Some say that an heron will destroy more fish in a week than an otter will in three months; but that seems carrying the matter too far. People who have kept herons, have had the curiosity to number out the fish they fed them with into a tub of water; and counting them again afterwards, it has been found that a heron will eat 50 moderate-sized dace and roaches in a day. It has been found, that in carp-ponds visited by this bird, one heron will eat up 1000 store carp in a year, and will hunt them so close that very few can escape. The readiest method of destroying this mischievous bird is by fishing for him in the manner of pike, with a baited hook; the bait consisting of small roach or dace, and the hook fastened to one end of a strong line, made of silk and wire twisted together. To the other end of the line is fastened a stone of a pound weight; and several of these baited lines being sunk by means of the stone in different parts of the pond, in a night or two the heron will not fail of being taken by one or other of them.

HERPES, in surgery, a kind of sore or pustule, which breaking out upon the skin, spreads in various directions; or sometimes heals on one side, or in the middle, while it eats the sound parts. As these appearances vary, the herpes accordingly receives different denominations. See **SURGERY**.

HERRERA TORDESILLAS (Anthony), a Spanish historian, was secretary to Vespasian Gonzaga, viceroy of Naples, and afterwards historiographer of the Indies, under king Philip II. who allowed him a considerable pension. He wrote a general history of the Indies, in Spanish, from 1492 to 1554; and of the world (not so much esteemed), from 1554 to 1598. He died in 1625, aged about 66.

HERRERA (Ferdinand de), an eminent Spanish poet, of the 16th century, was born at Seville, and principally succeeded in the lyric kind. Besides his poems, he wrote notes on Garcilasso de la Vega, and an account of the war of Cyprus, and the battle of Lepanto, &c.

HERRING, in ichthyology, a species of **CLUPEA**. The name *herring* is derived from the German *beer*, an *army*, which expresses their number when they migrate into our seas. Herrings are found in great plenty from the highest northern latitudes as low as the northern coasts of France. They are also met with in vast shoals on the coast of America, as low as Carolina: they are found also in the sea of Kamtschatka, and possibly reach Japan: but their winter rendezvous is within the arctic circle, whither they retire after spawning, and where they are provided with plenty of insect food. For an account of the remarkable migration of herrings, and the history of the fishery, &c. see **CLUPEA** and *Herring-Fishery*. They are in full roe at the end of June, and continue in perfection till the beginning of winter, when they begin to deposit their spawn.

There are different names given to preserved herrings, according to the different manners wherein they are ordered: as, 1. *Sea-sticks*; which are such as are caught all the fishing season, and are but once packed. A barrel of these holds six or eight hundred; eight barrels go to the ton by law; a hundred of herrings is to be a hundred and twenty; a last is ten thousand, and they commonly reckon fourteen barrels to the last. 2. There are others, repacked on shore, called *repacked herrings*; 17 barrels of sea-sticks commonly make from 12 to 14 of repacked herrings. The manner of repacking them is, to take out the herrings, wash them out in their own pickle, and lay them orderly in a fresh barrel: these have no salt put to them, but are close packed, and headed up by a sworn cooper, with pickle, when the barrel is half full. The pickle is brine; so strong as that the herring will swim in it. 3. *Summers*, are such as the Dutch chafers or divers catch from June to the 15th of July.

These are sold away in sea-sticks, to be used presently, in regard of their fatness; because they will not endure repacking. They go one with another, full and shotten; but the repacked herrings are sorted, the full herrings by themselves. 4. The *shotten and sick herrings* by themselves; the barrel whereof is to be marked distinctly. 5. *Cruv herrings*; which are such as are caught after the 14th of September. These are cured with that kind of salt called salt-upon-salt, and are carefully sorted out, all full herrings, and used in the repacking. 6. *Corved herrings*. These serve to make red herrings, being such as are taken in the Yarmouth seas, from the end of August to the middle of October; provided they can be carried ashore within a week, more or less, after they are taken. These are never gipped, but rowed in salt, for the better preserving of them, till they can be brought on shore; and such as are kept to make *red herrings* are washed in great vats in fresh water, before they are hung up in the *herring-hangs* or *red-herring* houses.

As for the *manner of salting herrings*. The nets being haled on board, the fishes are taken out, and put into the warbacks, which stand on one side of the vessels. When all the nets are thus unloaded, one fills the gippers baskets. The gippers cut their throats, take out their guts, and sling out the full herrings into one basket, and the shotten into another. One man takes the full basket when they are gipped, and carries them to the rower-back, wherein there is salt. One boy rows and flirs them about in the salt, and another takes them, thus rowed, and carries them in baskets to the packers. Four men pack the herrings into one barrel, and lay them, one by one, straight and even; and another man, when the barrel is full, takes it from the packers. It is left to stand a day or more open to settle, that the salt may melt and dissolve to pickle; after which it is filled up, and the barrel headed. The pickle is to be strong enough to sustain a herring; otherwise the fish decay in it.

HERRING (Thomas), archbishop of Canterbury, was the son of the rev. Mr John Herring, rector of Walsoken in Norfolk, where he was born in 1693. He was educated at Jesus college, Cambridge; was afterwards chosen fellow of Corpus Christi College, and continued a tutor there upwards of seven years. Having entered into priest's orders in 1710, he was successively minister of Great Shelford, Stow cum Qui, and Trinity in Cambridge; chaplain to Dr. Fleetwood, bishop of Ely; rector of Retringdon in Essex, and of Barly in Hertfordshire; preacher to the Society of Lincoln's Inn, chaplain in ordinary to his late majesty, rector of Blechingly in Surry, and dean of Rochester. In 1737 he was consecrated bishop of Bangor, and in 1743 translated to the archiepiscopal see of York. On the death of Dr. Potter in 1747, he was translated to the see of Canterbury; but in 1753 was seized with a violent fever, which brought him to the brink of the grave; and after languishing about four years, he died on the 13th of March 1757. He expended upwards of six thousand pounds in repairing and adorning the palaces of Croydon and Lambeth. This worthy prelate, in a most eminent degree, possessed the virtues of public life; his mind was filled with unaffected piety and benevolence, he was an excellent preacher, and a true friend to religious and civil liberty. After his death was published a volume of his sermons on public occasions.

HERRNHUT, or **HERRNHUTH**, the first and most considerable settlement of the United Brethren, commonly called *Moravians*, situated in Upper Lusatia, upon an estate belonging to the family of Nicolas Lewis Count Zinzendorf, about 50 miles east of Dresden. See the article *UNITED Brethren*. The building of this place was begun in 1727 by some emigrants from Moravia, who forsook their possessions on account of the persecution they suffered as Protestants from the Roman Catholics. It is situated upon the rise of an hill called the *Hutberg*,

or Watch-hill, from which they took occasion to call the new settlement *Herrnhut*, or the Watch of the Lord. The building, increase, and admirable regulations of this settlement occasioned no small surprise in the adjacent country; and caused, in 1732, 1736, and 1737, commissioners to be appointed to examine into the doctrines and proceedings of the brethren at Herrnhut. The commissioners made a favourable report; and ever since both Herrnhut and other settlements of the United Brethren in Saxony have been protected, and even several immunities offered them by the court, but not accepted. Herrnhut was visited in 1766 by the late emperor Joseph II. after his return from Dresden, by the present king of Prussia, and by several other royal personages, who expressed their satisfaction in examining its peculiar regulations. The United Brethren have settlements in Saxony, Silesia, and other parts of Germany; in Holland, Denmark, England, Ireland, and America. In England, their principal settlements are at Fulneck near Leeds, and Fairfield near Manchester. In Greenland, North and South America, the West Indies, and Russia, they have missions for the propagation of Christianity among the Heathens; and in many parts have had considerable success. See Busching's Account of the Rise and Progress of the Church of the Brethren, printed at Halle in 1781; and Crantz's History of the Brethren, London, 1780.

NEW HERRNHUT, the first mission settlement of the United Brethren in the island of St. Thomas in the West Indies, under Danish government, begun in 1739; their missionaries having endeavoured to propagate Christianity among the negro slaves ever since 1731, and suffered many hardships and persecutions, from which their converts were not exempted. Many of the planters finding in process of time that the Christian slaves were more tractable, moral, and industrious than the heathen, not only countenanced but encouraged their endeavours. These were also greatly facilitated by the protection of the king of Denmark, Christian VI. The settlement consists of a spacious negro church, a dwelling-house for the missionaries, negro-huts, out-houses, and gardens. From this place the islands of St. Croix and St. Jan were at first supplied with missionaries; and the Brethren have now two settlements in each. The negro converts belonging to their church amount in those three islands to near 8000 souls.

NEW HERRNHUT, is also the name of the oldest mission settlement of the United Brethren in Greenland. It is situated on Balls River, a few miles from the sea, near Davis's Streights, on the western coast of Greenland, not far from the Danish colony Godhaab. The two first missionaries were sent from Herrnhut in the year 1733, and their laudable intentions favoured by Christian VI. king of Denmark. They had to struggle in this uncultivated, frozen, and savage country, with inconceivable hardships, and found at first great difficulty in acquiring the language of the natives. However, after six years labour and perseverance, they had the satisfaction to baptize four persons, all of one family; and from that time the mission began to prosper, so that in the succeeding years two other settlements were begun, called Lichtenfels and Lichtenau: all of them continue in prosperity. About 1300 of the natives have been christianized since the beginning of this mission. See Crantz's History of Greenland, London, 1777.

HERSE, in fortification, a lattice, or portcullis, in form of an harrow, beset with iron spikes. The word *herse* is French, and literally signifies "harrow;" being formed of the Latin *herpex* or *irpex*, which denotes the same. It is usually hung by a rope fastened to a moulinet; to be cut, in case of surprise, or when the first gate is broken with a petard, that the herse may fall, and stop up the passage of the gate or other entrance of a fortress. The herse is otherwise called a *surrafin*, or *catarel*; and when it consists of straight stakes, without any cross-pieces, it is called *orgues*.

HERSE is also a harrow, which the besieged, for want of chevaux de frise, lay in the way, or in breaches, with the points up, to incommode the march as well of the horse as of the infantry.

HERSILLON, in the military art, a sort of plank or beam, ten or twelve feet long, whose two sides are driven full of spikes or nails, to incommode the march of the infantry or cavalry. The word is a diminutive of *herse*; the hersillon doing the office of a little herse. See *HERSE*.

HERTFORD, the county town of Herts, with a market on Saturday. In the beginning of the heptarchy it was considered as one of the principal cities of the E. Saxons. It is seated on the river Lea, which is now navigable for barges, but, at that period, was equally navigable for ships to this town. In 879, the Danes erected two forts here, for the security of their ships; but Alfred turned the course of the river, so that their vessels were left on dry ground. Edward, the eldest son of Alfred, built a castle here, which has been often a royal residence. It is still entire, and the habitation of a noble family. The town sends two members to parliament, and is governed by a high steward, mayor, and nine aldermen, a recorder, &c. Here were formerly five churches, but now only two. Hertford is two miles W. by S. of Ware, and 21 N. of London. E. lon. 0. 1. N. lat. 51. 50.

HERTFORDSHIRE, or *HERTS*, a county of England, bounded on the N. by Cambridgeshire, on the E. by Essex, on the N. W. by Bedfordshire, on the W. by Bucks, and on the S. by Middlesex. It is 36 miles long from N. to S. and 28 broad from E. to W. It is divided into eight hundreds, which contain 19 market towns, and 174 parishes, and sends six members to parliament. The northern skirts of this county are hilly, forming a scattered part of the chalky ridge which extends across the kingdom in this direction. A number of streams take their rise from this side, which, by their clearness, show the general nature of the soil to be inclined to hardness, and not abundantly rich. Flint stones are scattered in great profusion over the face of this county; and beds of chalk are frequently to be met with. It is found, however, with the aid of proper culture, to be extremely favourable to corn, both wheat and barley, which come to as great perfection here as in any part of the kingdom. The western part is, in general, a tolerably rich soil, and under excellent cultivation. Indeed, the traffic of the county is in corn and malt. The air is wholesome; and the principal rivers are the Lea, Stort, and Coln.

HERTGOVINZA, a territory of Turkey in Europe, in Dalmatia. Castel-Nuovo, the capital, belongs to the Venetians; and the rest, with a town of the same name, to the Turks.

HERTHA, or *HERTHUS*, in mythology, a deity worshipped by the ancient Germans. This is mentioned by Tacitus, in his book *De Moribus Germanorum*, cap. 40. Voßius conjectures, that this goddess was Cybele: but she was more properly Terra or the Earth; because the Germans still use the word *bert* for the earth, whence also the English *earth*.

HERTZBERG, a considerable town, in the electorate of Saxony, 35 miles N. W. of Dresden. E. lon. 13. 17. N. lat. 51. 41.

HERVEY (James), a clergyman of exemplary piety, was born in 1714, and succeeded his father in the livings of Weston Favell and Collingtree in Northamptonshire. These, being within five miles of each other, he attended alternately with his curate; till being confined by his ill health, he resided constantly at Weston; where he diligently pursued the labours of the ministry and his study, under the disadvantage of a weak constitution. He was remarkably charitable; and desired to die just even with the world, and to be, as he termed it, his own executor. This excellent divine died on Christmas-day 1758, leaving the little he possessed to buy warm clothing for the poor in that

severe season. No work is more generally or deservedly known than his *Meditations and Contemplations*: containing, *Meditations* among the Tombs, *Reflections* on a Flower-garden, a *Descant* on Creation, *Contemplations* on the Night and Starry Heavens, and a *Winter-piece*. The sublime sentiments in these pieces have the peculiar advantage of being conveyed in a flowing elegant language, and they have accordingly gone through many editions. He published besides, *Remarks* on Lord Bolingbroke's *Letters on History*; *Theron and Aspasio*, or a *Series of Dialogues* and *Letters* on the most important subjects; some sermons, and other tracts.

HERVEY *Island*, one of the South-Sea islands, discovered by captain Cook, September 23, 1773, who gave it that name in honour of the earl of Bristol. It is a low island, situated in W. lon. 158. 54. S. lat. 19. 8.

HESBON, ESEBON, or *Hesebon*, in ancient geography, the royal city of the Amorites, in the tribe of Reuben, according to Moses: though in Joshua xxi. 39. where it is reckoned among the Levitical cities, it is put in the tribe of Gad; which argues its situation to be on the confines of both.

HESDIN, a strong town of France, in the department of the Straits of Calais and late county of Artois, seated on the river Canche, 25 miles S. S. W. of St. Omer, and 165 N. of Paris. E. lon. 2. 6. N. lat. 50. 24.

HESIOD, a very ancient Greek poet; but whether cotemporary with Homer, or a little older or younger than him, is not yet agreed among the learned; nor is there light enough in antiquity to settle the matter exactly. His father, as he tells us in his *Opera et Dies*, was an inhabitant of Cumæ, one of the Eolian isles, now called *Taio Nova*; and removed from thence to Ascra, a little village of Bœotia, at the foot of mount Helicon, where Hesiod was probably born, and called, as he often is, *Ascreus*, from it. Of what quality his father was, is nowhere said; but that he was driven by his misfortunes from Cumæ to Ascra, Hesiod himself informs us. His father seems to have prospered better at Ascra than he did in his own country; yet Hesiod could arrive at no higher fortune than keeping sheep on the top of mount Helicon. Here the muses met with him, and entered him into their service:

Erewhile as they the shepherd swain behold,
Feeding beneath the sacred mount his fold,
With love of charming song his breast they fir'd,
There met the heav'nly muses first inspir'd;
There, when the maids of Jove the silence broke,
To Hesiod thus the shepherd swain they spoke, &c.

To this account, which is to be found in the beginning of his *Generatio Deorum*, Ovid alludes in these two lines:

*Nec mihi sunt visæ Clio, Cliausque sorores,
Servanti pecudes vallibus, Ascra, tuis.*

Nor Clio nor her sisters have I seen,
As Hesiod saw them in the Ascrean green.

On the death of the father, an estate was left, which ought to have been equally divided between the two brothers Hesiod and Perses; but Perses defrauded him in the division, by corrupting the judges. Hesiod was so far from resenting this injustice, that he expresses a concern for those mistaken mortals who place their happiness in riches only, even at the expence of their virtue. He lets us know, that he was not only above want, but capable of assisting his brother in time of need; which he often did though he had been so ill used by him. The last circumstance he mentions relating to himself is his conquest in a poetical contention. Archidamus, king of Eubœa, had instituted funeral games in honour of his own memory, which his sons afterwards took care to have performed. Here Hesiod was a competitor for the prize in poetry; and won a tripod, which he consecrated

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to the muses. Hesiod having entered himself in the service of the muses, left off the pastoral life, and applied himself to the study of arts and learning. When he was grown old (for it is agreed by all that he lived to a very great age), he removed to Locris, a town about the same distance from mount Parnassus as Ascra was from Helicon. His death was tragical. The man with whom he lived at Locris, a Milesian born, ravished a maid in the same house; and though Hesiod was entirely ignorant of the fact, yet being maliciously accused to her brothers as an accomplice, he was injuriously slain with the ravisher, and thrown into the sea. The *Theogony*, and *Works and Days*, are the only undoubted pieces of this poet now extant: though it is supposed that these poems have not descended perfect and finished to the present time. A good edition of Hesiod's works was published by Mr. Le Clerc at Amsterdam in 1701.

HESPER, HESPERUS, in astronomy, the evening star; an appellation given to Venus when she follows or sets after the sun. The word is formed of the Greek Ἑσπερος; and is supposed to have been originally the proper name of a man, brother of Atlas, and father of the Hesperides. Diodorus, lib. iii. relates, that Hesperus, having ascended to the top of mount Atlas, the better to observe and contemplate the stars, never returned; and that hence he was fabled to have been changed into this star.

HESPERIA, an ancient name of Italy; so called by the Greeks from its western situation. *Hesperia* was also an appellation of Spain; but with the epithet *ultima* (Hor.), to distinguish it from Italy, which is called *Hesperia magna* (Virg.), from its extent of empire.

HESPERI CORNU, called the *Great Bay* by the author of Hanno's Periplus; but most interpreters, following Mela, understand a promontory; some Cape Verd, others Palmas Cape: Vossius takes it to be the former, since Hanno did not proceed so far as the latter cape. 50.

HESPERIDEÆ, in botany, from the Hesperides; *golden* or *precious fruit*: the name of the 19th order in Linnæus's *Fragments of a Natural Method*. See BOTANY, p. 50.

HESPERIDES, in the ancient mythology, were the daughters of Hesper or Hesperus, the brother of Atlas. According to Diodorus, Hesperus and Atlas were two brothers who possessed great riches in the western parts of Africa. Hesperus had a daughter called Hesperia, who married her uncle Atlas, and from this marriage proceeded seven daughters, called *Hesperides* from the name of their mother, and *Atlantides* from that of their father. According to the poets, the *Hesperides* were three in number, Ægle, Arethusa, and Hesperithusa. Hesiod, in his *Theogony*, makes them the daughters of Nox, Night, and seats them in the same place with the Gorgons; viz. at the extremities of the west, near mount Atlas: it is on that account he makes them the daughters of Night, because the sun sets there. The Hesperides are represented by the ancients as having the keeping of certain golden apples, on the other side the ocean. And the poets give them a dragon to watch the garden where the fruit grows: this dragon, they tell us, Hercules slew and carried off the apples. Pliny and Solinus will have the dragon to be no other than an arm of the sea, wherewith the garden was encompassed, and which defended the entrance thereof; and Varro supposes, that the golden apples were nothing but sheep. Others, with more probability, say they were oranges. The *Gardens* of the HESPERIDES are placed by some authors at Larach, a city of Fez; by others, at Bernich a city of Barca, which accords better with the fable. Others take the province of Susa in Morocco for the island wherein the garden was seated. And, lastly, Rudbecks places the Fortunate Islands, and the gardens of the Hesperides, in his own country, Sweden.

HESPERIDUM INSULÆ, in ancient geography, islands near the Hesperii Cornu; but the accounts of them are so-

much involved in fable, that nothing certain can be affirmed of them.

HESPERIS, **ROCKET**, *Dame's Violet*, or *queen's gilliflower*; a genus of the filiquosa order, belonging to the tetradynamia class of plants; and in the natural method ranking under the 39th order, *Siliquosæ*. The petals are turned obliquely; there is a glandule within the shorter stamina; the siliqua almost upright; the stigma forked at the base, connivent, or closing at the top; the calyx close. The species are, 1. The *matronalis*, or common sweet-scented garden rocket, having fibrous roots, crowned with a tuft of long, spear-shaped, rough leaves; upright, single, hairy stalks, two feet high; garnished with oval lanceolate, slightly indented, close-fitting leaves; and the stalk and branches terminated by large and long spikes of sweet-scented flowers of different colours and properties in the varieties, of which there are a great number. All the varieties of this species are so remarkable for imparting a fragrant odour, that the ladies were fond of having them in their apartments. Hence they derived the name of *dame's violet*; and, bearing some resemblance to a stock-gilliflower, were sometimes also called *queen's gilliflower*; but are now most commonly called *rocket*. 2. The *inodora*, or scentless rocket, hath a fibrous root; upright, round, firm stalks, two feet high, garnished with spear-shaped, acute-pointed, sharply indented, close-fitting, leaves; and all the branches terminated by large spikes of scentless flowers, with obtuse petals, of different colours and properties in the varieties. This species makes a fine appearance, but hath no scent. 3. The *triflis*, or dull-flowered night-smelling rocket, hath fibrous roots, upright, branching, spreading, bristly stalks, two feet high; spear-shaped pointed leaves; and spikes of pale purple flowers, of great fragrance in the evening.

All the species are hardy, especially the first and second, which prosper in any of the open borders, and any common garden-soil; but the third, being rather impatient of a severe frost, and of much moisture in winter, should have a dry warm situation, and a few may be placed in pots to be sheltered in case of inclement weather. They may be propagated either by seeds, by offsets, or by cuttings off the stalks.

HESPERUS, in fabulous history, son of Cephalus by Aurora, as fair as Venus, was changed into a star, called *Lucifer* in the morning, and *Hesperus* in the evening. See **HESPER**.

HESSE, a country in the circle of the Upper Rhine, in Germany, bounded on the N. by the bishopric of Paderborn and duchy of Brunswick; on the E. by Thuringia; on the S. by the territory of Fulde and Weteravia; and on the W. by the counties of Nassau, Witgenstein, Hartzfeldt, and Waldeck. The house of Hesse is divided into four branches, namely, Hesse-Cassel, Homberg, Darmstadt, and Rhinefeldt, each of which has the title of landgrave, and takes its name from one of the four principal towns. This country is about 100 miles in length, and 50 in breadth, and surrounded by woods and mountains, in which are mines of iron and copper. In the middle are fine plains, fertile in corn and pastures; and there is plenty of all sorts of fruit and honey. They likewise cultivate a large quantity of hops, which serve to make excellent beer. Birch trees are very common, and they make a great deal of wine of the sap. The landgrave of Hesse-Cassel is an absolute prince, and derives a considerable part of his revenue from his troops, which he lets out to such of the powers of Europe as may be induced to give him an advantageous subsidy.

HESSIAN FLY, a very mischievous insect, which a few years ago appeared in North America; and whose depredations threatened then to destroy the crops of wheat in that country entirely. It is, in its perfect state, a small winged insect; but the mischief it does is while in the form of a caterpillar; and the difficulty of destroying it is increased by its being as yet unknown where it deposits its eggs, to be hatched before the first

appearance of the caterpillars. These mischievous insects begin their depredations in autumn, as soon as the wheat begins to shoot up through the ground. They devour the tender leaf and stem with great voracity, and continue to do so till stopped by the frost; but no sooner is this obstacle removed by the warmth of the spring, than the fly appears again, laying its eggs now, as has been supposed, upon the stems of the wheat just beginning to spire. The caterpillars, hatched from these eggs, perforate the stems of the remaining plants at the joints, and lodge themselves in the hollow within the corn, which shows no sign of disease till the ears begin to turn heavy. The stems then break; and being no longer able to perform their office in supporting and supplying the ears with nourishment, the corn perishes about the time that it goes into a milky state. These insects attack also rye, barley, and timothy-grass, though they seem to prefer wheat. The destruction occasioned by them is described in the American Museum (a magazine published at Philadelphia) for February 1787, in the following words: "It is well known that all the crops of wheat in all the land over which it has extended, have fallen before it, and that the farmers beyond it dread its approach; the prospect is, that unless means are discovered to prevent its progress, the whole continent will be over-run;—a calamity more to be dreaded than the ravages of war."

This terrible insect appeared first in Long Island during the American war, and was supposed to have been brought from Germany by the Hessians; whence it had the name of the *Hessian-fly*. From thence it proceeded inland at the rate of about 15 or 20 miles annually; and by the year 1789 had reached 200 miles from the place where it was first observed. At that time it continued to proceed with unabating increase; being apparently stopped neither by rivers nor mountains. In the fly state it is likewise exceedingly troublesome; by getting into houses in swarms, falling into victuals and drink; filling the windows, and flying perpetually into the candles. It still continued to infest Long Island as much as ever; and in many places the culture of wheat was entirely abandoned.

Mr. Morgan, in a communication to the Philadelphia Society for promoting agriculture, informs us, that he had made himself acquainted with the fly by breeding a number of them from the chrysalis into the perfect state. The fly is at first of a white body with long black legs and whiskers, so small and motionless as not to be easily perceived by the naked eye, though very discernible with a microscope; but they soon become black and very nimble, both on the wing and feet, being about the size of a small ant. During the height of the brood in June, where 50 or 100 of the nits have been deposited on one stalk of wheat, he has sometimes discovered, even with the naked eye, some of them to twist and move on being disturbed: this is while they are white; but they do not then travel from one stalk to another, nor to different parts of the same stalk. The usual time of their spring-hatching from the chrysalis is in May. "Those (says he) who are doubtful whether the fly is in their neighbourhood, or cannot find their eggs or nits in the wheat, may satisfy themselves by opening their windows at night and burning a candle in the room. The fly will enter in proportion to their numbers abroad. The first night after the commencement of wheat harvest, this season, they filled my dining-room in such numbers as to be exceedingly troublesome in the eating and drinking vessels. Without exaggeration I may say, that a glass tumbler from which beer had been just drank at dinner, had 500 flies in it in a few minutes. The windows are filled with them when they desire to make their escape. They are very distinguishable from every other fly by their horns or whiskers."

The American States are likewise infested with another mischievous insect, named the *Virginian wheat-fly*. This, however,

has not yet passed the river Delaware; though there is danger of its being gradually inured to colder climates so as to extend its depredations to the northern colonies also. But it is by no means the same with the Hessian fly. The wheat fly is the same with that whole ravages in the Angmois in France are recorded by M. Du Hamel; it eats the grain, and is a moth in its perfect state. On the other hand, the Hessian fly has hitherto been unknown to naturalists; it eats only the leaf and stalk; and, in its perfect state, is probably a tenthredo, like the black negro-fly of the turnip.

As great quantities of wheat were at this time imported from America into Britain, it became an object worthy of the attention of government to consider how far it was proper to allow of such importation, lest this destructive insect might be brought along with the grain. The matter, therefore, was fully canvassed before the privy council; and the following is the substance of the information relative to it; and in consequence of this, the importation of American wheat was at that time forbid by proclamation.

From a very extensive correspondence which was instituted on this subject, between Mr. Bond the British consul at Philadelphia, and many others, with Sir Joseph Banks, the latter drew up a report for the privy council, dated March 2, 1789, in which he states the following particulars: 1. The appearance of the fly in Long Island was first observed in 1779. We must suppose this to be meant, that its destructive effects became then first perceptible; for it seems undoubtedly to have been known in the year 1776. 2. The opinion of colonel Morgan, that it was imported by the Hessians, seems to be erroneous, as no such insect can be found to exist in Germany or any other part of Europe. 3. Since its first appearance in Long Island it has advanced at the rate of 15 or 20 miles a-year, and neither waters nor mountains have impeded its progress. It was seen crossing the Delaware like a cloud, from the Fall's Township to Makefield; had reached Saratoga, 200 miles from its first appearance, infesting the counties of Middlesex, Somerset, Huntington, Morris, Sussex, the neighbourhood of Philadelphia, all the wheat counties of Connecticut, &c. committing the most dreadful ravages; attacking wheat, rye, barley, and timothy-grass. 4. The Americans, who have suffered by this insect, speak of it in terms of the greatest horror. In colonel Morgan's letter to Sir John Temple, he uses the following expressions. "Were it to reach Great Britain, it would be the greatest scourge that island ever experienced; as it multiplies from heat and moisture, and the most intense frosts have no effect on the egg or aurelia. Were a single straw, containing the insect, egg, or aurelia, to be carried and safely deposited in the centre of Norfolk in England, it would multiply in a few years, so as to destroy all the wheat and barley crops of the whole kingdom. There cannot exist such an atrocious villain as to commit such an act intentionally. 5. No satisfactory account of the mode in which this insect is propagated has hitherto been obtained. Those who say that the eggs are deposited on the stalk from six or eight to 50, and by their growth compress and hinder the stalk from growing, are evidently deceived, and the authors of the assertion plainly mistake the animal itself for its eggs. It is sufficient to remember, that eggs do not grow or increase in bulk, to prove that what they observed were not eggs. 6. The landholder's opinion, that the eggs are deposited on the ripe grains of wheat, though contradicted by colonel Morgan, is not disproved, as the colonel advances no argument against it. 7. A letter dated New York, September 1, 1786, says that the eggs are deposited on the young blade, resembling what we call a *fly-blow* in meat; very small, and but one in a place: but this, though the only natural mode of accounting for the appearance of the insect, had it been true, must undoubtedly have been confirmed by numbers of observa-

tions. 8. Even though this should be found hereafter to be the case, there will still remain a danger of the aurelias' being beaten off by the scail from the straw in threshing the wheat, and imported into Britain along with it; the presence of these flies in barns having been fully proved by the observations of Messrs. Potts and Bond. 9. None of the remedies proposed against this destructive insect have been in any degree effectual, excepting that of sowing the yellow bearded wheat; the straw of which is sufficiently strong to resist the impression of the insect, and, even if its eggs are deposited upon it, receives little injury in point of produce in grain: this provides, however, no remedy for the loss of the barley crop, nor for that which must be incurred by sowing the yellow-bearded wheat on lands better suited by nature for the produce of other kinds: it appears also that this very kind is liable to degenerate, and probably from a different cause than that assigned by colonel Morgan, viz. the mixture with common wheat. 9. Though the Agricultural Society at Philadelphia, as well as colonel Morgan, have declared their opinions decisively that no danger can arise from wheat imported into Britain, as the insect has no immediate connection with the grain; yet with nearly if not exactly the same materials before him which these gentlemen were furnished with, Sir Joseph Banks could not avoid drawing an inference directly contrary; and he concludes his report with the words of Mr. Bond in a letter to the marquis of Caermarthen. "Satisfactory as it would be to my feelings to be able to say with precision, that I apprehend no danger of extending the mischief by seed, my duty urges me to declare, that I have not heard or seen any conclusive fact by which I could decide on a matter of such importance; and till that test occurs, the wisdom of guarding against so grievous a calamity is obvious."

On the 27th of April the same year, another paper, by way of appendix to the foregoing, was given in by Sir Joseph Banks. In this he again observes, that none of the descriptions of any European insect hitherto published answer exactly to the Hessian fly. In a letter from Mr. Bond to the marquis of Caermarthen, he mentions another kind of insect in the state of Maryland, called by way of eminence *the fly*; and which in some things resembles the Hessian fly, though it cannot be accounted the same. It makes its way into the mow, and bites the ends of the grain perceptibly, and no doubt deposits its eggs in the grain itself; since it has been observed, that wheat recently threshed, and laid in a dry warm place, will soon be covered with an extreme clammy crust, which binds the wheat on the surface together in such a way as to admit its being lifted in lumps; but the wheat beneath will not be hurt to any considerable depth. Such is the quality of this fly, that if the hand be inserted into the heap infested by it, watery blisters are immediately raised; and the farmers and slaves, riding upon bags of this infested wheat, never fail to be severely blistered thereby. "This insect (says he) is called in Maryland the *Revolution fly*, by the friends of the British government; but from all I can learn it is not the same insect which originated on Long Island, and is called the *Hessian fly* (by way of opprobrium) by those who favoured the revolution. All the papers I have read on the Hessian fly are very inaccurate, not to say contradictory; and I am convinced it is by no means a settled point at this moment in what manner and place the eggs of these insects are deposited."

In another letter to the same nobleman, Mr. Bond expresses himself to the following purpose: "I have not been able to collect any decided information which fixes the essential point, how far the insect may be communicated by seed. It is a matter at this time quite undecided here: nor have I heard or observed any very conclusive reason to suppose that the fly makes its way generally into barns and ricks. A very intelligent farmer in the county of Bucks informed me that it was the pre-

vailing opinion there, and so I found it, that the fly did not either in the field or in the mow affect the grain of the wheat: a neighbour of his, in threshing the little wheat he had saved last harvest, observed the fly rise from the straw in great numbers wherever it was struck by the flail; but though it was at first presumed that the fly had intimated itself into the mow for the purpose of depositing its eggs in the grain or in the straw, no trace of the egg could be discovered from the appearance of any mucus or dust, either in the grain or in the straw; hence it was inferred that all the mischief was done in the field."

HESYCHIUS, the most celebrated of all the ancient Greek grammarians whose works are now extant, was a Christian; and, according to some, the same with Hesyechius patriarch of Jerusalem, who died in 609. He wrote a Greek lexicon; which, in the opinion of Casaubon, is the most learned and useful work of that kind produced by the ancients. Schrevelius published a good edition of it in 1668, in 4to, with notes; but the best is that of John Alberti, printed at Leyden in 1746, in two vols. folio.

HETERIARCH, HÆTERIARCHIA, in antiquity, an officer in the Greek empire, whereof there were two species; the one called simply *b. teriarch*, and the other *great heteriarch*, who had the direction of the former. The word is Greek, ἑταιριάρχια, formed of the Greek ἑταίριος *focius*, "companion, ally," and ἀρχή *imperium*, "command." Their principal function was to command the troops of the allies; besides which, they had some other duties in the emperor's court, described by Codin. *De officiis*, cap. 5. n. 30, 31, 32, 37.

HETEROCLITE, HETEROCLITON, in grammar, an irregular or anomalous word, which either in declension, conjugation, or regimen, deviates from the ordinary rules of grammar. The word is Greek, ἑτεροκλιτον; formed of ἕτερος *alter*, "another, different," and κλινω, "I decline." Heteroclite is more peculiarly applied to nouns which vary or are irregular in point of declension; having fewer cases, numbers, &c. than ordinary; or that are of one declension in one number, and another in another: as, *Hoc vas, vasis*; *hec vasa, vasorum*.

HETERODOX, in polemical theology, something that is contrary to the faith or doctrine established in the true church. The word is formed of the Greek ἑτεροδοξος; a compound of ἕτερος "alter," and δόξα "opinion." Thus we say a *heterodox* opinion, a *heterodox* divine, &c. The word stands in opposition to *orthodox*.

HETEROGENEITY, in physics, the quality or disposition which denominates a thing *heterogeneous*. The word is also used for the heterogeneous parts themselves; in which sense, the heterogeneities of a body are the same thing with the impurities thereof.

HETEROGENEOUS, or HETEROGENEAL, literally imports something of a different nature, or that consists of parts of different or dissimilar kinds; in opposition to *homogeneous*. The word is Greek; formed of ἕτερος, *alter*, "different," and γένος, *genus*, "kind;" *q. d.* composed of different kinds of parts.

HETEROGENEOUS *Light*, is by Sir Isaac Newton said to be that which consists of rays of different degrees of refrangibility. Thus the common light of the sun or clouds is heterogeneous, being a mixture of all sorts of rays.

HETEROGENEOUS *Nouns*, one of the three variations in irregular nouns; or such as are of one gender in the singular number, and of another in the plural.—Heterogeneous, under which are comprehended mixed nouns, are six-fold. 1. Those which are of the masculine gender in the singular number, and neuter in the plural; as, *hic tartarus, hec tartara*. 2. Those which are masculine in the singular number, but masculine and neuter in the plural; as, *hic locus, bi loci, & hec loca*. 3. Such as are feminine in the singular number, but neuter in the plural; as *hec*

earthafus, & hec earthafa. 4. Such nouns as are neuter in the singular number, but masculine in the plural; as, *hoc cælum, bi cæli*. 5. Such as are neuter in the singular, but neuter and masculine in the plural; as, *hoc rastrum, bi rastri, & hec rastra*. And, 6. Such as are neuter in the singular, but feminine in the plural number; as, *hec epulum, he epulæ*.

HETEROGENEOUS *Quantities*, are those which are of such different kind and consideration, as that one of them, taken any number of times, never equals or exceeds the other.

HETEROGENEOUS *Surds*, are such as have different radical signs; as, \sqrt{aa} , and $\sqrt[3]{bb}$; $\sqrt[5]{9}$, and $\sqrt[7]{19}$.

HETEROSCII, in geography, a term of relation, denoting such inhabitants of the earth as have their shadows falling but one way, as those who live between the tropics and polar circles; whose shadows at noon in north latitude are always to the northward, and in south latitude to the southward.

HETRURIA, and ETRURIA, a celebrated country of Italy, at the west of the Tyber. It originally contained 12 different nations, which had each their respective monarch. Their names were Veientes, Clusini, Perusini, Cortonenses, Arretini, Vetuloni, Volaterrani, Rufellani, Volscinii, Tarquinii, Falisci, and Cæretani. The inhabitants were particularly famous for their superstition and strict confidence in omens, dreams, auguries, &c. They all proved powerful and resolute enemies to the rising empire of the Romans, and were conquered only after much effusion of blood.

HEVÆI, in ancient geography, one of the seven people who occupied Canaan; a principal and numerous people, and the same with the *Kadmonai*, dwelling at the foot of Hermon and partly of Libanns, or between Libanus and Hermon (Judges iii. 3.) To this Bochart refers the fables concerning Cadmus and his wife Harmonia, or Hermonia, changed to serpents; the name *Hewi* denoting a wild beast, such as is a serpent. Cadmus, who is said to have carried the use of letters to Greece, seems to have been a Kadmonean; of whom the Greeks say that he came to their country from Phœnicia.

HEUCHERA, in botany; a genus of the digynia order, belonging to the pentandria class of plants. There are five petals; the capsule is birostrated and bilocular.

HEVELIUS, or HEVELKE, (John), an eminent astronomer, was born at Dantzic in 1611. He studied in Germany, England, and France, and every where obtained the esteem of the learned. He was the first that discovered a kind of libration in the moon, and made several important observations on the other planets. He also discovered several fixed stars, which he named the *firmament of Sobieski*, in honour of John III. king of Poland. His wife was also well skilled in astronomy, and made a part of the observations published by her husband. In 1673 he published a description of the instruments with which he made his observations, under the title of *Machina Cælestis*: and in 1679 he published the second part of this work; but in September the same year, while he was at a seat in the country, he had the misfortune to have his house at Dantzic burnt down. By this calamity he is said have sustained a loss of several thousand pounds; having not only his observatory and all his valuable instruments and apparatus destroyed, but also a great number of copies of his *Machina Cælestis*; which accident has made this second part very scarce, and consequently very dear. In the year 1690 were published *Firmamentum Sobiescianum, and Prodromus astronomiæ & novæ tabule solares, una cum catalogo fixarum*, in which he lays down the necessary preliminaries for taking an exact catalogue of the stars. But both these works are posthumous; for Hevelius died in 1687, on his birth-day, aged 76. He was a man greatly esteemed by his countrymen, not only on account of his great reputation and skill in astronomy, but as a very excellent and worthy magistrate. He was made a burgo-master of Dantzic; which office he is said to

have executed with the utmost integrity and applause. He was also very highly esteemed by foreigners; and not only by those skilled in astronomy and the sciences, but by foreign princes and potentates: as appears abundantly from a collection of their letters, which were printed at Dantzig in the year 1683.

HEVER, a town of Austrian Brabant, two miles S. of Louvain. E. lon. 4. 49. N. lat. 50. 51.

HEUKELUM, a town of the United Provinces, in Holland, seated on the river Linge, five miles from Gorcum. E. lon. 4. 55. N. lat. 51. 55.

HEUSDEN, a strong town of the United Provinces, in Holland, seated on the river Maese, with a handsome castle; eight miles N. W. of Bois-le-duc. E. lon. 5. 3. N. lat. 51. 44.

HEWSON (William), a very ingenious anatomist, was born in 1739. He became assistant to Dr. Hunter, and was afterwards in partnership with him; but, on their disagreement, read anatomical lectures at his own house (in which he was seconded by Mr. Falconer). He wrote *Inquiries into the Properties of the blood, and the Lymphatic system*, 2 vols; and disputed with Dr. Monro the discovery of the lymphatic system of vessels in oviparous animals. He died in 1774, in consequence of absorption from a wound received in dissecting.

HEXACHORD, in ancient music, a concord called by the moderns a *sixth*.

HEXAGON, in geometry, a figure of six sides and angles; and if these sides and angles are equal, it is called a *regular hexagon*.

HEXAHEDRON, in geometry, one of the five platonic bodies, or regular solids, being the same with a cube.

HEXAMETER, in ancient poetry, a kind of verse consisting of six feet; the first four of which may be indifferently either spondees or dactyls; the fifth is generally a dactyl, and the sixth always a spondee. Such is the following verse of Horace:

1 2 3 4 5 6
Aut pro|disse vo|lunt, aut|dele|clare po|etæ.

HEXAMILION, HEXAMILI, or *Hexamilium*, a celebrated wall, built by the emperor Emanuel in 1413 over the isthmus of Corinth. It took its name from *ἑξήκοντα*, and *μύριον*, which in the vulgar Greek signifies a *mile*, as being six miles long. The design of the hexamilion was to defend Peloponnesus from the incursions of the barbarians. Amurath II. having raised the siege of Constantinople in the year 1424, demolished the hexamilium, though he had before concluded a peace with the Greek emperor. The Venetians restored it in the year 1463, by 30,000 workmen, employed for 15 days, and covered by an army commanded by Bertoldo d'Este general of the land forces, and Louis Loredano commander of the sea. The infidels made several attempts upon it; but were repulsed, and obliged to retire from the neighbourhood thereof: but Bertoldo being killed at the siege of Corinth, which was attempted soon after, Fertino Calcinato, who took on him the command of the army, abandoned, upon the approach of the beglerbeg, both the siege and the defence of the wall which had cost them so dear; upon which it was finally demolished.

HEXANDRIA, in botany, from *ἑξήκοντα*, and *ἄνθρωπος* a man; the name of the sixth class in Linnæus's sexual method, consisting of plants with hermaphrodite flowers, which are furnished with six stamina or male organs, that are of an equal length. See BOTANY, p. 39.

HEXAPLA, formed of *ἑξήκοντα*, and *πλῶς* I open, I unfold, in church-history, a Bible disposed in six columns; containing the text, and divers versions thereof, compiled and published by Origen, with a view of securing the sacred text from future corruptions, and to correct those that had been already introduced. Eusebius, Hist. Eccl. lib. vi. cap. 16. relates, that Ori-

gen, after his return from Rome under Caracalla, applied himself to learn Hebrew, and began to collect the several versions that had been made of the sacred writings, and of these to compose his Tetrapla and Hexapla; others, however, will not allow him to have begun till the time of Alexander, after he had retired into Palestine, about the year 231.

To conceive what this Hexapla was, it must be observed, that, besides the translation of the sacred writings, called the Septuagint, made under Ptolemy Philadelphus, above 280 years before Christ, the Scripture had been since translated into Greek by other interpreters. The first of those versions, or (reckoning the Septuagint) the second, was that of Aquila, a proselyte Jew, the first edition of which he published in the 12th year of the emperor Adrian, or about the year of Christ 128; the third was that of Symmachus, published, as is commonly supposed, under Marcus Aurelius, but, as some say, under Septimius Severus, about the year 200; the fourth was that of Theodotion, prior to that of Symmachus, under Commodus, or about the year 175. These Greek versions, says Dr. Kennicott, were made by the Jews from their corrupted copies of the Hebrew, and were designed to stand in the place of the Seventy, against which they were prejudiced, because it seemed to favour the Christians. The fifth was found at Jericho, in the reign of Caracalla, about the year 217; and the sixth was discovered at Nicopolis, in the reign of Alexander Severus, about the year 228: lastly, Origen himself recovered part of a seventh, containing only the Psalms.

Now Origen, who had held frequent disputations with the Jews in Egypt and Palestine, observing that they always objected to those passages of Scripture quoted against themselves, and appealed to the Hebrew text; the better to vindicate those passages, and confound the Jews by showing that the Seventy had given the sense of the Hebrew, or rather to show by a number of different versions what the real sense of the Hebrew was, undertook to reduce all these several versions into a body along with the Hebrew text, so as they might be easily confronted, and afford a mutual light to each other.

He made the Hebrew text his standard; and allowing that corruptions might have happened, and that the old Hebrew copies might and did read differently, he contented himself with marking such words or sentences as were not in his Hebrew text, nor the later Greek versions, and adding such words or sentences as were omitted in the Seventy, prefixing an asterisk to the additions, and an obelisk to the others. In order to this, he made choice of eight columns: in the first he gave the Hebrew text in Hebrew characters; in the second the same text in Greek characters; the rest were filled with the several versions above mentioned; all the columns answering verse for verse, and phrase for phrase; and in the Psalms there was a ninth column for the seventh version.

This work Origen called *ἑξάπλω*, *Hexapla*, q. d. *sextuple*, or work of six columns, as only regarding the first six Greek versions. See TETRAPLA. Indeed, St. Epiphanius, taking in likewise the two columns of the text, calls the work *Octapla*, as consisting of eight columns. This celebrated work, which Montfaucon imagines consisted of fifty large volumes, perished long ago, probably with the library at Cæsarea, where it was preserved, in the year 653; though several of the ancient writers have preserved us pieces thereof: particularly St. Chrysostom on the Psalms, Philoponus in his *Hexameron*, &c. Some modern writers have earnestly endeavoured to collect fragments of the Hexapla, particularly Flaminius Nobilius, Drusus, and F. Montfaucon, in two folio volumes, printed at Paris in 1713.

HEXASTYLE, in architecture, a building with six columns in front.

HEXHAM, a town of Northumberland, with a market on Tuesday. It is seated on the river Tyne, and was formerly fa-

mous for an abbey and church, one of which is now decayed, and a great part of the other was pulled down by the Scots. Near this place, in 1463, was fought a bloody battle, between the houses of York and Lancaster, in which the latter was defeated. Hexham is noted for its manufactory of tanned leather, shoes, and gloves; and is 22 miles W. of Newcastle, and 284 N. N. W. of London. W. lon. 2. 1. N. lat. 55. 3.

HEYDON, a borough in the E. riding of Yorkshire, with a market on Thursday. It is seated on a river, which soon falls into the Humber; and was formerly a considerable town, but is now much decayed. It is six miles W. of Hull, and 181 N. by W. of London. W. lon. 0. 5. N. lat. 53. 45.

HEYDON (John), who sometimes assumed the name of *Eugenius Theodidactus*, was a great pretender to skill in the Rosicrucian philosophy and the celestial signs, in the reign of king Charles I.; and wrote a considerable number of chemical and astrological works, with very singular titles. This ridiculous author was much resorted to by the duke of Buckingham, who was infatuated with judicial astrology. He employed him to calculate the king's and his own nativity, and was assured that his stars had promised him great things. The duke also employed Heydon in some treasonable and seditious practices, for which he was sent to the Tower. He lost much of his former reputation by telling Richard Cromwell and Thurloe, who went to him disguised like cavaliers, that Oliver would infallibly be hanged by a certain time; which he out-lived several years.

HEYLIN (Dr. Peter), an eminent English writer, was born at Burford, in Oxfordshire, in 1600. He studied at Hart Hall, Oxford; where he took his degrees in arts and divinity, and became an able geographer and historian. He was appointed one of the chaplains in ordinary to king Charles I. was presented to the rectory of Hemingsford in Huntingdonshire, made a prebendary of Westminster, and obtained several other livings: but of these he was deprived by the parliament, who also sequestered his estate; by which means he and his family were reduced to great necessity. However, upon the Restoration, he was restored to his spiritualities; but never rose higher than to be subdean of Westminster. He died in 1662, and was interred in St. Peter's church in Westminster, where he had a neat monument erected to his memory. His writings are very numerous: the principal of which are, 1. *Microcosmus*, or a Description of the Great World. 2. *Cosmographia*. 3. The History of St. George. 4. *Ecclesia Vindicata*, or the Church of England justified. 5. Historical and Miscellaneous Tracts, &c.

HEYWOOD (John), one of our most ancient dramatic poets, was born at North-Mims, near St. Alban's in Hertfordshire, and educated at Oxford. From thence he retired to the place of his nativity; where he had the good fortune to become acquainted with Sir Thomas More, who, it seems, had a seat in that neighbourhood. This patron of genius introduced our comic poet to the princess Mary, and afterwards to her father Henry, who, we are told, was much delighted with his wit and skill in music, and by whom he was frequently rewarded. When his former patroness, queen Mary, came to the crown, Heywood became a favourite at court, and continued often to entertain her majesty, *exercising his fancy before her, even to the time that she lay languishing on her death-bed*. On the accession of Elizabeth, being a zealous Papist, he thought fit to decamp, with other favourites of her deceased majesty. He settled at Mechlin in Flanders, where he died in the year 1565. John Heywood was a man of no great learning, nor were his poetical talents by any means extraordinary; but he possessed talents of more importance in the times in which he lived, namely, the talents of a jester. He wrote several plays; 500 epigrams; *A Dialogue in Verse concerning English Proverbs*; and *The Spider and Fly*, a Parable, a thick 4to. Before the title of this last

work is a whole-length wooden print of the author; who is also represented at the head of every chapter in the book, of which there are 77. He left two sons, who both became Jesuits and eminent men: *viz.* Ellis Heywood, who continued some time at Florence under the patronage of cardinal Pole, and became so good a master of the Italian tongue, as to write a treatise in that language, intitled *Il Moro*; he died at Louvain about the year 1572. His other son was Jasper Heywood, who was obliged to resign a fellowship at Oxford on account of his immoralities: he translated three tragedies of Seneca, and wrote various poems and devices; some of which were printed in a volume intitled *The Paradise of Dainty Devices*, 4to, 1573. He died at Naples in 1597.

HEYWOOD (Eliza), one of the most voluminous novel writers this island ever produced; of whom we know no more than that her father was a tradesman, and that she was born about the year 1696. In the early part of her life, her pen, whether to gratify her own disposition or the prevailing taste, dealt chiefly in licentious tales, and memoirs of personal scandal: the celebrated *Atalantis* of Mrs. Manley served her for a model; and *The Court of Carimania*, *The new Utopia*, with some other pieces of a like nature, were the copies her genius produced. She also attempted dramatic writing and performance, but did not succeed in either. Whatever it was that provoked the resentment of Pope, he gave full scope to it by distinguishing her as one of the prizes to be gained in the games introduced in honour of Dulness, in his *Dunciad*. Nevertheless, it seems undeniable, that there is much spirit, and much ingenuity, in her manner of treating subjects, which the friends of virtue may perhaps wish she had never meddled with at all. But, whatever offence she may have given to delicacy or morality in her early works, she appears to have been soon convinced of, and endeavoured to atone for, in the latter part of her life; as no author then appeared a greater advocate for virtue. Among her riper productions may be specified, *The Female Spectator*, 4 vols; *The history of Miss Betsy Thoughtless*, 4 vols; *Jenny and Jenny Jessamy*, 3 vols; *The invisible spy*, 4 vols; with a pamphlet intitled *A present for a servant-maid*. She died in 1759.

HIAMEN, or ΕΜΟΥΥ. See ΕΜΟΥΥ.

HIATUS, properly signifies an opening, chasm, or gap; but it is particularly applied to those verses where one word ends with a vowel, and the following word begins with one, and thereby occasions the mouth to be more open, and the sound to be very harsh. The term *hiatus* is also used in speaking of manuscripts, to denote their defects, or the parts that have been lost or effaced.

HIBISCUS, SYRIAN MALLOW; a genus of the polyandria order, belonging to the monadelphia class of plants; and in the natural method ranking under the 37th order, *Columniferae*. The calyx is double, the exterior one polyphyllous, the capsule quinquelocular and polyspermous. Of this genus there are 36 species; the most remarkable are, 1. The *Syriacus*, commonly called *alibæa frutex*, is a native of Syria. It rises with shrubby stalks to the height of eight or ten feet, sending out many woody branches covered with a smooth grey bark, garnished with oval spear-shaped leaves, whose upper parts are frequently divided into three lobes. The flowers come out from the wings of the stalk at every joint of the same year's shoot. They are large, and shaped like those of the mallow, having five large roundish petals which join at their base, spreading open at the top, in the shape of an open bell. These appear in August; and if the season is not too warm, there will be a succession of flowers till September. The flowers are succeeded by short capsules, with five cells, filled with kidney-shaped seeds; but unless the season proves warm, they will not ripen in this country. Of this species there are four or five varieties, differing in the

colour of their flowers: the most common hath pale purple flowers with dark bottoms; another hath bright purple flowers with black bottoms; a third hath white flowers with purple bottoms; and a fourth variegated flowers with dark bottoms. There are also two with variegated leaves, which are by some much esteemed. All these varieties are very ornamental in a garden. 2. The *Rosa Sinensis*, with an arborecent stem, and egg-pointed sawed leaves. It is a native of the East Indies, whence it has got the name of *China rose*; but the seeds having been carried by the French to their West India settlements, it hath thence obtained the name of *Martinico rose*. Of this there are the double and single flowering kinds; the seeds of the first frequently produce plants that have only single flowers, but the latter seldom vary to the double kind. 3. The *mutabilis*, or changeable rose, has a soft spongy stem, which by age becomes ligneous and pithy. It rises to the height of 12 or 14 feet, sending out branches towards the top, which are hairy, garnished with heart-shaped leaves, cut into five acute angles on their borders, and slightly sawed on their edges; of a lucid green on their upper side, but pale below. The flowers are produced from the wings of the leaves; the single are composed of five petals which spread open, and are at first white, but afterwards change to a blush rose colour, and as they decay turn purple. In the West Indies, all these alterations happen on the same day, and the flowers themselves are of no longer duration; but in Britain the changes are not so sudden. The flowers are surrounded by short, thick, blunt, capsules, which are very hairy; having five cells, which contain many small kidney-shaped seeds, having a fine plume of fibrous down adhering to them. 4. The *albemarfchus*, or musk-seeded hibiscus, is a native of the West Indies, where the French cultivate great quantities of it. The plant rises with an herbaceous stalk three or four feet high, sending out two or three side-branches, garnished with large leaves cut into six or seven acute angles, sawed on their edges, having long footstalks, and placed alternately. The stalks and leaves of this sort are very hairy. The flowers come out from the wings of the leaves upon pretty long footstalks which stand erect. They are large, of a sulphur colour, with purple bottoms; and are succeeded by pyramidical five cornered capsules, which open in five cells, filled with large kidney-shaped seeds of a very musky odour. 5. The *tiliaceus*, or maho-tree, is a native of both the Indies. It rises with a woody, pithy stem, to the height of ten feet, dividing into several branches towards the top, which are covered with a woolly down, garnished with heart-shaped leaves ending in acute points. They are of a lucid green on their upper side, and hoary on the under side, full of large veins, and are placed alternately. The flowers are produced in loose spikes at the end of the branches, and are of a whitish-yellow colour. They are succeeded by short acuminate capsules, opening in five cells, filled with kidney-shaped seeds. 6. The *trionum*, Venice mallow, or flower of an hour, is a native of some parts of Italy, and has long been cultivated in the gardens of this country. It rises with a branching stalk a foot and a half high, having many short spines, which are soft, and do not appear unless closely viewed: the leaves are divided into three lobes, which are deeply jagged almost to the midrib. The flowers come out at the joints of the stalks, upon pretty long foot-stalks. They have a double empalement; the outer being composed of ten long narrow leaves, which join at their base: the inner is of one thin leaf swollen like a bladder, cut into five acute segments at the top, having many longitudinal purple ribs, and is hairy. Both these are permanent, and inclose the capsule after the flower is past. The flower is composed of five obtuse petals, which spread open at the top; the lower part forming an open bell-shaped flower. These have dark purple bottoms, but are of a pale sulphur-colour above. In hot weather the flowers continue but a few hours open; however, there

is a succession of flowers that open daily for a considerable time. 7. The *esculentus*, or eatable hibiscus, rises to five or six feet; has broad five-parted leaves, and large yellow flowers. The pod or okra is from two to six inches long, and one inch diameter. When ripe it opens longitudinally in five different places, and discharges a number of heart-shaped seeds.

The first sort may be propagated either by seeds or cuttings. The seeds may be sown in pots filled with light earth about the latter end of March, and the young plants transplanted about the same time next year. They will succeed in the full ground; but must be covered in winter whilst young, otherwise they are apt to be destroyed. The second, third, fifth, and seventh sorts are propagated by seeds, which must be sown in a hot-bed. The young plants are to be transplanted into small separate pots, and treated like other tender vegetables, only allowing them a good share of air. The fourth sort is annual in this country, though biennial in those places where it is native. It is propagated by seeds, and must be treated in the manner directed for Amaranth. The sixth sort is propagated by seeds, which should be sown where the plants are designed to remain, for they do not bear transplanting well. They require no other culture than to be kept free from weeds, and thinned where they are too close; and if the seeds are permitted to scatter, the plants will come up fully as well as if they had been sown.

The fourth sort is cultivated in the West Indies by the French for the sake of its seeds. These are annually sent to France in great quantities, and form a considerable branch of trade, but the purposes which they answer are not certainly known. The inner rind of the fifth sort is very strong, and of great esteem, which the following passage from Dampier may serve to illustrate: "They (the Musketo Indians) make their lines, both for fishing and striking, with the bark of Maho, which is a sort of tree or shrub that grows plentifully all over the West Indies, and whose bark is made up of strings or threads very strong: you may draw it off either in flakes or small threads, as you have occasion. It is fit for any manner of cordage, and privateers often make their rigging of it." See BARK.

The seventh sort is a native of the West Indies, where it is cultivated in gardens and inclosures as an article of food. The whole of it is mucilaginous, especially the pods. "These (Dr. Wright informs us) are gathered green, cut into pieces, dried, and sent home as presents, or are boiled in broths or soups for food. It is the chief ingredient in the celebrated pepper-pot of the West Indies, which is no other than a rich olla: the other articles are either flesh meat, or dried fish and capicum. This dish is very palatable and nourishing. As a medicine, okra is employed in all cases where emollients and lubricants are indicated."

HICETAS of Syracuse, an ancient philosopher and astronomer, who taught that the sun and stars were motionless, and that the earth moved round them. This is mentioned by Cicero, and probably gave the first hint of the true system to Copernicus. He flourished 344 B. C.

HICKES (George), an English divine of extraordinary parts and learning, born in 1642. In 1681 he was made king's chaplain, and two years after dean of Worcester. The death of Charles II. stopped his farther preferment; for though his church principles were very high, he manifested too much zeal against Popery to be any favourite with James II. On the revolution, he with many others was deprived for refusing to take the oaths to king William and queen Mary; and soon after, archbishop Sancroft and his colleagues considering how to maintain episcopal succession among those who adhered to them, Dr. Hickes carried over a list of the deprived clergy to king James; and with his sanction a private consecration was performed, at which it is said lord Clarendon was present. Among others, Dr. Hickes was consecrated suffragan bishop of Thetford, and died in 1715. He wrote, 1. *Institutiones Grammaticæ Angli-*

Saxonia, et Maso-Gothica. 2. *Antiqua literatura septentrionalis.* 3. Two treatises, one of the Christian priesthood, the other of the dignity of the episcopal order. 4. Jovian, or an answer to Julian the apostate. 5. Sermons: with many temporary controversial pieces on politics and religion.

HICKUP, or HICCUGH, a spasmodic affection of the stomach, œsophagus, and muscles subservient to deglutition, arising sometimes from some particular stimulus acting on the stomach, œsophagus, diaphragm, &c. and sometimes from a general affection of the nervous system. See MEDICINE.

HIDAGE, *Hidagium*, was an extraordinary tax payable to the kings of England for every hide of land. This taxation was levied not only in money, but in provision, armour, &c.; and when the Danes landed in Sandwich in 994, king Ethelred taxed all his lands by hides; so that every 310 hides found one ship furnished, and every eight hides furnished one jack and one saddle, to arm for the defence of the kingdom, &c. Sometimes the word *hidage* was used for the being quit of that tax: which was also called *bidgild*; and interpreted, from the Saxon, “a price or ransom paid to save one’s skin or hide from beating.”

HIDALGO, in modern history, a title given in Spain to all who are of noble family. The *Hidalgos* claim a descent from those valiant soldiers who retired into Castile, and the mountains of Asturias, and other remote parts of Spain, on the invasion of the Moors, where having fortified themselves, they successively descended into the plains, in proportion to the success of their arms: from the notoriety of their persons, or the lands they became possessed of, they acquired the appellation of *Hidalgos notorios*, *Hidalgos de solar conocido*, or *de casa solariega*. Of these, according to Hernando Mexia, there are three sorts; the first being lords of places, villages, towns, or castles, from whence they took their surnames, as the Guzmans, Mendozas, Laras, Guivaras, and others; the second, who recovered any fortresses from the Moors, as the Ponces of Leon, and others; and the third sort, from the places where they resided, or held jurisdiction, as Rodrigo de Narvaez was called of Antequera, from being Alcayde there. But this definition is not considered as exact or conclusive by Otalora, another civilian, who says that the true meaning of *Hidalgos de solar conocido* is explained by the laws of Castile to be a well known mansion or possession, the nature of which is particularly explained in the laws of *Parditas*, lib. 5. tit. 35. which describe three sorts of tenures called *Devifa*, *Solar e. a.*, and *Behetria*. By the first, lands are devised by the ancestor; *Solar* is a tenure upon another person’s manor, and obliges the owner to receive the lord of the fee when necessity obliges him to travel; and *Behetria* is in the nature of an *allodum*. In proportion as these Aborigines gained ground on the Moors, and increased in their numbers, many private persons distinguished themselves by their valour, and obtained testimonies of their services, called *cartas de merced*, which served them as a foundation of their birth and good descent, without which documents their posterity could not make it appear; and if from a lapse of time, or other unavoidable accidents, such proof should happen to be lost or destroyed, the law affords them a remedy under these circumstances, by a declaration, importing, that such persons as are supposed to have had such certificates, may be relieved by making it appear that their ancestors, time immemorial, have always been held and reputed as *Hidalgos*, and enjoyed the privileges of such, from a strong presumption in their favour; the possession of land having equal force to any other document; which is fully set forth in the *Pragmatica* of Cordova. To these executory letters are granted *cartas executorias*, expressive of their privileges; and for the better regulation of their matters, proper officers are appointed in the chancery courts, called *alcaldes de los hidalgos*, who ought to be *hidalgos* themselves, and hold jurisdiction in these cases, and no others: but even here innovations have

taken place; for as these grants flow from the sovereign, who is the fountain of honour, some are declared *Hidalgos de sangre*, by right of descent, and others *de privilegio*, or by office, in which the will of the sovereign has made amends for any deficiency of blood.

There is a set of people near Segovia, at a place called Zamarrainala, who are exempt from tribute on account of the care they take in sending proper persons every night to the castle of Segovia to stand sentinel—One cries out, *Vela, vela, bzo!* and the other blows a horn, from whence they have been titled *Hidalgos by the horn*. In Catalonia, those gentlemen who are styled *Hombre de Pareja*, are considered the same as *hidalgos* in Castile, and were so called from the word *parejar*, to equip, this name being given as a distinction by Borelo the 4th count of Barcelona, at the siege of that city, in 965, who summoning all his vassals to come to his assistance against the Moors, nine hundred horsemen well mounted and equipped joined him, and with their aid he took the city; and this appellation has been given in honourable remembrance of this loyal action.

These noble *hidalgos* enjoy many privileges and distinctions: of which the following are the principal. 1. The first and greatest privilege which they hold by law is to enjoy all posts of dignity and honour in the church and state, with liberty, when churchmen, of having a plurality of benefices. They are qualified for receiving all orders of knighthood, and are to be preferred in all embassies, governments, and public commissions. 2. When they are examined as witnesses in civil and criminal cases, their depositions are to be taken in their own houses, without being obliged to quit them to go to those of others. 3. In all churches, processions, and other public acts or assemblies, they are to have the next place of honour and precedence after the officers of justice, conforming themselves to particular customs. 4. They are not obliged to accept of any challenge for combat, supposing such were allowed of, but from those who are their equals. 5. Though it is forbidden to guardians to purchase the estates of minors, this does not extend to *Hidalgos*, in whom the law does not suppose any fraud, and they may purchase them publicly. 6. They are permitted to be seated in courts of justice in presence of the judges, from the respect and honour due to them. They have also seats in the courts of chancery, in consideration of their birth, which gives them a right to be near the persons of princes. 7. Their persons are free from arrest for debt, nor can any attachment be laid on their dwelling-houses, furniture, apparel, arms, horses, or mules in immediate use: nor can they make a cession of their estates, nor be distressed in suits of law, farther than their circumstances will admit of, but are to be allowed a reasonable and decent maintenance for their support. 8. In cases of imprisonment for criminal matters, they are to be treated differently from others. They are generally confined to their own houses with a safe guard, or under arrest upon their honour, or allowed the city or town they lived in, and in particular cases are sent into castles. 9. When punishments are inflicted for criminal cases, they are to be less severe to them than to others, as they are not to suffer ignominious punishments, such as public shame, whipping, galleys; nor are they to be hanged, but beheaded, excepting in cases of treason or heresy. In cases that do not imply a corporal punishment, but a pecuniary one, they are treated with more rigour, and pay a larger fine than others. 10. They are not to be put to the rack or torture, excepting for such heinous crimes as are particularly specified by the laws. 11. When there are title-deeds or other writings or papers in which two or more persons have an equal right or property, and require a particular charge, they are to be given up by preference to the custody of an *hidalgo*, if any of the parties are such. 12. The daughter of an *hidalgo* enjoys every privilege of her birth, though married to a commoner; and a woman who is not an

hidalgo enjoys all these privileges when she is a widow, following the fortune of her husband. But if the widow is an hidalgo, and the late husband was a commoner, she falls into the state of her husband after his death, though she had the privileges of her birth during his life. 13. They are free from all duties, called *Pechos*, *Pedidos*, *Monedas*, *Marteniegas*, *Contribuciones*, as well royal as civil, and all other levies of whatever kind they may be, with a reserve for such as are for the public benefit, in which they are equally concerned, such as the repairing the highways, bridges, fountains, walls, destruction of locusts and other vermin. 14. They are free from personal service, and from going to the wars, excepting when the king attends in person; even then they are not to be forced, but invited, and acquainted that the royal standard is displayed. 15. No persons whatever can be quartered upon, or lodged in their houses, except when the king, queen, prince, or infantess are on the road, as in such cases even the houses of the clergy are not exempt. 16. They cannot be compelled to accept of the office of receiver of the king's rents, or any other employment which is considered as mean and derogatory to their dignity and rank. 17. By a particular custom confirmed by royal authority in that part of Castile beyond the Ebro, bastards succeed to their parents, and enjoy their honours, contrary to the royal and common law. 18. If a lady, who marries a commoner, should be a queen, duchess, marchioness, or countess (for they have no barons in Castile), she not only does not lose her rank, but conveys her titles to her husband, who holds them in right of his wife.

These are the general privileges which the hidalgos enjoy; there are some others of less consequence, as well as particular grants to certain persons and families. An ancient and ridiculous custom is said to be observed by noble ladies who are widows of plebeians, in order to recover their birthright; for which purpose they carry a pack-saddle on their shoulders to their husband's grave, then throwing it down and striking it three times, say, 'Villein, take thy villeiny, for I will abide by my nobility:' and then they recover their privileges again.

HIDE, the skin of a beast; but the word is particularly applied to those of large cattle, as bullocks, cows, horses, &c. Hides are either raw, that is, just as taken off the carcase: salted, or seasoned with salt, alum, and saltpetre, to prevent their spoiling; or curried and tanned. See TANNING.

HIDE of Land, was such a quantity of land as might be ploughed with one plough within the compass of a year, or as much as would maintain a family; some call it 60, some 80, and others 100 acres.

HIDE Bound. See FARRIERY, page 427.

HIERACIUM, HAWKWEED; a genus of the polygamia æqualis order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked, the calyx imbricated and ovate; the pappus simple and sessile. The *Species* are, 1. The *aurantiacum*, commonly called *Grim the collier*, hath many oblong oval entire leaves crowning the root; an upright, single, hairy, and almost leafless stalk, a foot high, terminated by reddish orange-coloured flowers in a corymbus. These flowers have dark oval ath-coloured calyces; whence the name of *Grim the collier*. 2. The *pilosella*, or mouse-ear, hath blossoms red on the outside, and pale yellow within; the cups set thick with black hairs. The flowers open at eight in the morning, and close about two in the afternoon. 3. The *umbellatum*, grows to the height of three feet, with an erect and firm stalk, terminated with an umbel of yellow flowers. The first is the only species cultivated in gardens. It is propagated by seeds, or parting the roots. The seed may be sown in autumn or spring. In June, when the plants are grown two or three inches high, they may be picked out and planted in beds, where they must be left till the next autumn, and then transplanted where they are to remain.

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The second species is commonly in dry pastures in England; it has a milky juice, but is less bitter and astringent than is usual with plants of that class. It is reckoned hurtful to sheep. An insect of the cochineal genus (*Coccus Polonicus*) is often found at the roots (*Act. Upsal.* 1752). Goats eat it; sheep are not fond of it; horses and swine refuse it. The third species is a native of Scotland, and grows in rough stony places, but is not very common. The flowers are sometimes used for dyeing yarn of a fine yellow colour.

HIERACITES, in church-history, Christian heretics in the third century: so called from their leader Hierax, a philosopher of Egypt; who taught that Melchisedek was the Holy Ghost, denied the resurrection, and condemned marriage.

HIERA PICRA. See PHARMACY.

HIERAPOLIS, in ancient geography, a town of Phrygia, abounding in hot springs, and having its name from the number of its temples. There are coins exhibiting figures of various gods who had temples here. Of this place was Epictetus the stoic philosopher. It is now called *Pambouk*; and is situated near the Scamander, on a portion of Mount Mesogis, distant six miles from Laodicea. Its site appears at a distance as a white lofty cliff; and upon arriving at it, the view which it presents is so marvellous, that the description of it, to bear even a faint resemblance, ought to appear romantic. See Dr. Chandler's *Travels in Asia Minor*, p. 229.

HIERARCHY, among divines, denotes the subordination of angels. Some of the rabbins reckon four, others ten, orders or ranks of angels; and give them different names according to their different degrees of power and knowledge. *Hierarchy* likewise denotes the subordination of the clergy, ecclesiastical polity, or the constitution and government of the Christian church considered as a society.

HIERES, a town of France, in the department of Var and late province of Provence, seated in a pleasant fruitful country; but its harbour being choked up, it is now much decayed. In no other part of France is nature so uniformly beautiful. During great part of the winter, the verdure is as fine as in the spring; and in many gardens, green peas may be gathered. The winters, however, have been sometimes very severe; particularly in 1709, 1768, and 1789. This town is the birth-place of Massillon, the celebrated French preacher. It is 12 miles E. of Toulon, and 350 S. by E. of Paris. E. lon. 6. 20. N. lat. 43. 5.

HIERES, islands of France, on the coast of Provence. They are four in number; namely, Porquerollos, Porteros, and Baguetau, which are inhabited, and the isle of Titan, the largest of them, which is capable of cultivation. Between these islands and the continent, is the road of Hieres, which is so capacious and excellent, that it has afforded shelter for the largest squadrons, and no instance of a shipwreck has ever occurred here. It is defended by three forts.

HIEROCLES, a cruel persecutor of the Christians, and a violent promoter of the persecution under Dioclesian, flourished in 302. He wrote some books against the Christian religion; in which he pretends some inconsistencies in the Holy Scriptures, and compares the miracles of Apollonius Tyaneus to those of our Saviour. He was refuted by Lactantius and Eusebins. The remains of his works were collected into one volume octavo, by bishop Pearson; and published in 1654, with a learned dissertation prefixed to the work.

HIEROCLES, a Platonic philosopher of the fifth century, taught at Alexandria, and was admired for his eloquence. He wrote seven books upon Providence and Fate; and dedicated them to the philosopher Olympiodorus, who by his embassies did the Romans great services under the emperors Honorius and Theodosius the younger. But these books are lost, and we only know them by the extracts in Photius. He wrote also a

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Commentary upon the golden verses of Pythagoras; which is still extant, and has been several times published with those verses.

HIEROGLYPHICS, in antiquity, mystical characters, or symbols, in use among the Egyptians, and that as well in their writings as inscriptions; being the figures of various animals, the parts of human bodies, and mechanical instruments. The word is composed of the Greek *ἱερός* *sacer*, "holy," and *γλυφίαν* *sculpere*, "to engrave;" it being the custom to have the walls, doors, &c. of their temples, obelisks, &c. engraven with such figures. Hieroglyphics are properly emblems or signs of divine, sacred, or supernatural things; by which they are distinguished from common symbols, which are signs of sensible and natural things. Hermes Trismegistus is commonly esteemed the inventor of hieroglyphics: he first introduced them into the heathen theology, from whence they have been transplanted into the Jewish and Christian. Sacred things, says Hippocrates, should only be communicated to sacred persons. Hence it was that the ancient Egyptians communicated to none but their kings and priests, and those who were to succeed to the priesthood and the crown, the secrets of nature, and the secrets of their morality and history; and this they did by a kind of cabbala, which, at the same time that it instructed them, only amused the rest of the people. Hence the use of hieroglyphics, or mystic figures, to veil their morality, politics, &c. from profane eyes. This author, it may be observed, and many others, do not keep to the precise character of a hieroglyphic, but apply it to profane as well as divine things.

Hieroglyphics are a kind of real characters, which do not only denote, but in some measure express, the things. Thus, according to Clemens Alexandrinus, Strom. v. a lion is the hieroglyphic of strength and fortitude; a bullock, of agriculture; a horse, of liberty; a sphinx, of subtilty, &c.

Such is the opinion that has generally been embraced, both by ancient and modern writers, of the origin and use of hieroglyphics. It has been almost uniformly maintained, that they were invented by the Egyptian priests in order to conceal their wisdom from the knowledge of the vulgar; but the late bishop Warburton hath, with much ingenuity and learning, endeavoured to show that this account is erroneous.

According to this writer, the first kind of hieroglyphics were mere pictures, because the most natural way of communicating our conceptions by marks or figures was by tracing out the images of things; and this is actually verified in the case of the Mexicans, whose only method of writing their laws and history was by this picture writing. But the hieroglyphics invented by the Egyptians were an improvement on this rude and inconvenient essay towards writing, for they contrived to make them both pictures and characters. In order to effect this improvement, they were obliged to proceed gradually, by first making the principal circumstance of the subject stand for the whole; as in the hieroglyphics of Horapollon, which represent a battle of two armies in array by two hands, one holding a shield and the other a bow: then putting the instrument of the thing, whether real or metaphorical, for the thing itself, as an eye and sceptre to represent a monarch, a ship and pilot the governor of the universe, &c.; and finally, by making one thing stand for or represent another, where their observations of nature or traditional superstitions led them to discover or imagine any resemblance: thus, the universe was designed by a serpent in a circle, whose variegated spots denoted the stars; and a man who had nobly surmounted his misfortune was represented by the skin of the hyæna, because this was supposed to furnish an invulnerable defence in battle.

The Chinese writing, he observes, was the next kind of improvement in the use of hieroglyphics. The Egyptians joined characteristic marks to images; the Chinese threw out the images

and retained only the contracted marks, and from these marks proceeded letters. The general concurrence of different people in this method of recording their thoughts can never be supposed to be the effect of imitation, sinister views, or chance; but must be considered as the uniform voice of nature speaking to the rude conceptions of mankind: for not only the Chinese of the East, the Mexicans of the West, and the Egyptians of the South, but the Scythians likewise of the North, and the intermediate inhabitants of the earth, viz. the Indians, Phœnicians, Ethiopians, &c. used the same way of writing by picture and hieroglyphic.

The bishop farther shows, that the several species of hieroglyphic writing took their rise from nature and necessity, and not from choice and artifice, by tracing at large the origin and progress of the art of speech. He proceeds to show how in process of time the Egyptian hieroglyphics came to be employed for the vehicle of mystery. They used their hieroglyphics two ways; the one more simple, by putting the part for the whole, which was the curiologic hieroglyphic; and the other more artificial, by putting one thing of resembling qualities for another, called the *tropical hieroglyphic*: thus the moon was sometimes represented by a half circle and sometimes by a cynocephalus. They employed their proper hieroglyphics to record openly and plainly their laws, policies, public morals, and history, and all kinds of civil matters: this is evident from their obelisks, which were full of hieroglyphic characters, designed to record singular events, memorable actions, and new inventions; and also from the celebrated inscription on the temple of Minerva at Sais, where an infant, an old man, a hawk, a fish, and a river-horse, expressed this moral sentence: "All you who come into the world and go out of it, know this, that the gods hate impudence." However, the tropical hieroglyphics, which were employed to divulge, gradually produced symbols which were designed to secrete or conceal: thus Egypt was sometimes expressed by the crocodile, sometimes by a burning censor with a heart upon it; where the simplicity of the first representation and the abstruseness of the latter show, that the one was a tropical hieroglyphic for communication, and the other a tropical symbol invented for secrecy.

Enigmatic symbols were afterwards formed by the assemblage of different things, or of their properties that were less known; and though they might have been intelligible at first, yet when the art of writing was invented, hieroglyphics were more generally disused; the people forgot the signification of them; and the priests, retaining and cultivating the knowledge of them because they were the repositories of their learning and history, at length applied them to the purpose of preserving the secrets of their religion.

Symbols were the true original of animal worship in Egypt, as Sir John Marsham conjectured, *Can. Chron.* p. 58. because in these hieroglyphics was recorded the history of their greater deities, their kings, and law-givers, represented by animals and other creatures. The symbol of each god was well known and familiar to his worshippers, by means of the popular paintings and engravings on their temples and other sacred monuments; so that the symbol presenting the idea of the god, and that idea exciting sentiments of religion, it was natural for them, in their addresses to any particular god, to turn to his representative mark or symbol; especially when we consider farther, that the Egyptian priests feigned a divine original for hieroglyphic characters, in order to increase the veneration of the people for them. These would of course bring on a relative devotion to these symbolic figures, which, when it came to be paid to the living animal, would soon terminate in an ultimate worship.

Another consequence of the sacredness of the hieroglyphic characters was, that it disposed the more superstitious to engrave them on gems, and wear them as amulets or charms. This magical

abuse seems not to have been much earlier than the established worship of the god Serapis, which happened under the Ptolemies, and was first brought to the general knowledge of the world by certain Christian heretics and natives of Egypt, who had mixed a number of Pagan superstitions with their Christianity. These gems, called *abraxas*, are frequently to be met with in the cabinets of the curious, and are engraven with all kinds of hieroglyphic characters. To these abraxas succeeded the talismans.

HIEROGRAMMATISTS, (*Hierogrammatei*), i. e. *holy registers*, were an order of priests among the ancient Egyptians, who presided over learning and religion. They had the care of the hieroglyphics, and were the expositors of religious doctrines and opinions. They were looked upon as a kind of prophets; and it is pretended, that one of them predicted to an Egyptian king, that an Israelite (meaning Moses), eminent for his qualifications and achievements, would lessen and depress the Egyptian monarchy. The hierogrammatei were always near the king, to assist him with their information and counsels. The better to fit them for this, they made use of the skill and knowledge they had acquired in the stars and the motions of the heavenly lights, and even of the writings of their predecessors, wherein their functions and duties were delivered. They were exempted from all civil employments, were reputed the first persons in dignity next the king, and bore a kind of sceptre in form of a ploughshare. After Egypt became a province of the Roman empire, the hierogrammatei sunk into neglect.

HIEROMANCY, in antiquity, that species of divination which predicted future events from observing the various things offered in sacrifice. See **DIVINATION** and **SACRIFICE**.

HIEROMNEMON, among the ancient Greeks, signified a delegate chosen by lot, and sent to the great council of the Amphictyons, where he was to take care of what concerned religion. The hieromnemonies were reckoned more honourable than the other members of that assembly, the general meetings of which were always summoned by them, and their names were prefixed to the decrees made by that council.

HIEROMNEMON, composed of *ἱερός* "sacred," and *μνημων* "one who advertises or puts in mind of," an officer in the ancient Greek church, whose principal function was to stand behind the patriarch at the sacraments, ceremonies, &c. and show him the prayers, psalms, &c. which he was to rehearse. He also clothed the patriarch in his pontifical robes, and assigned the places of all those who had a right to be around him when seated on his throne, as the master of the ceremonies now does to the pope.

HIERONYMUS. See **JEROME**.

HIEROPHANTES, or **HIEROPHANTA**, from *ἱερός* *holy*, and *φαίνω* *I appear*, in antiquity, a priest among the Athenians. The hierophantes was properly the chief person that officiated in the Eleusinia, that great solemnity sacred to Ceres. This office was first executed by Eumolpus, and continued in his family for 1200 years, though when any person was appointed to this dignity, he was required always to live in celibacy. St. Jerome says, that the hierophantes extinguished the fire of lust by drinking cicuta or the juice of hemlock, or even by making themselves eunuchs. Apollodorus observes, that it was the hierophantes who instructed persons initiated into their religion in the mysteries and duties thereof, and that it was hence he derived his name: for the same reason he was called *prophetes*, "the prophet." He had officers under him to do the same thing, or to assist him therein, who were also called *prophetes* and *exegetes*, i. e. "explainers of divine things." To the hierophantes it belonged to dress and adorn the statues of the gods, and to bear them in processions and solemn ceremonies.

HIEROPHYLAX, an officer in the Greek church, who was

guardian or keeper of the holy utensils, vestments, &c. answering to our sacrista or vestry-keeper.

HIESMES, a town of France, in the department of Orne and late province of Normandy, seated on a barren mountain, 10 miles from Seez, and 90 W. of Paris.

HIGH, a term of relation, importing one thing's being superior or above another: thus we say, a *high* mountain, the *high* court of parliament, *high* relief, &c.

HIGH, in music, is sometimes used in the same sense with *loud*, and sometimes in the same sense with *acute*.

HIGH Dutch is the German tongue in its greatest purity, as it is spoken in Misnia, &c.

HIGH Operation, in surgery, a method of extracting the stone; thus called, because the stone was taken out at the upper part of the bladder, above the pubis. This operation is now, very properly, superseded by one much safer and more successful.

HIGH-Places, were eminences on which the heathens used to worship their gods, chosen for that purpose as being supposed to be nearer heaven, their constant residence. The Jews are frequently blamed for their attachment to high-places, after the manner of the Gentiles; though their *proseuchæ* were frequently upon mountains with groves planted about them. Where high-places are reprobated in scripture, therefore, we should understand them as abused and prostituted to idolatrous purposes. Before the temple was built, there was indeed nothing in the high-places very contrary to the law, provided God only was adored there, and that no incense or victims were offered to idols. Under the judges they seem to have been tolerated; and Samuel offered sacrifices in several places besides the tabernacle, where the ark was not present. Even in David's time, they sacrificed to the Lord at Shilo, Jerusalem, and Gibeon; but after the temple was built, and a place prepared for the fixed settlement of the ark, it was no more allowed of to sacrifice out of Jerusalem. Solomon, in the beginning of his reign, went a pilgrimage to Gibeon; but from that time we see no lawful sacrifices offered out of the temple.

HIGH-Priest. See **PONTIFEX** and **PRIEST**.

HIGH-Way, a free passage for the king's subjects; on which account it is called *the king's high way*, though the freehold of the soil belong to the owner of the land. Those ways that lead from one town to another, and such as are drift or cart ways, and are for all travellers in great roads, or that communicate with them, are high ways only; and as to their reparation, are under the care of commissioners and surveyors.

HIGH-WAY-MEN, are robbers on the high way; for the apprehending and taking of whom, a reward of 40*l.* is given by the statute of 4 and 5 W. & M. to be paid within a month after conviction by the sheriff of the county; to which the statute 8 Geo. II. cap. 16. superadds 10*l.* to be paid by the hundred indemnified by such taking.

HIGHAM FERRERS, a borough of Northamptonshire, with a great market on Thursday and Saturday. It is seated on an ascent, on the river Nen, and sends one member to parliament. It had formerly a castle, now in ruins; and is 35 miles E. S. E. of Coventry, and 66 N. N. W. of London. W. lon. 0. 40. N. lat. 52. 19.

HIGHGATE, a large village in Middlesex, seated on a hill E. of that of Hampstead; on which account, these two hills have been poetically called "the sister-hills." Here lord chief-baron Cholmondeley built a free-school in 1562, which was enlarged in 1570, by Edwin Sandys, bishop of London, who added a chapel to it, which is a chapel of ease to the two parishes of St. Pancras and Hornsey. Highgate is four miles N. by W. of London.

HIGHLANDERS, a general appellation for the inhabitants of the mountainous parts of any country. In Britain, the name

is appropriated to the people who inhabit the mountainous parts of Scotland, to the north and north-west, including those of the Hebrides or Western Isles. They are a branch of the ancient Celtæ; and undoubtedly the descendants of the first inhabitants of Britain, as appears from the many monuments of their language still retained in the most ancient names of places in all parts of the island. The Highlanders, or, as they are often termed by ancient authors, the *Caledonians*, were always a brave, warlike, and hardy race of people; and, in the remotest times, seem to have possessed a degree of refinement in sentiment and manners then unknown to the other nations that surrounded them. This appears not only from their own traditions and poems, but also from the testimony of many ancient authors. This civilization was probably owing in a great measure to the order of the bards, or Druids, and some other institutions peculiar to this people.

The ancient Highlanders lived in the hunting state till some time after the era of Fingal, who was one of their kings towards the close of the third century. For some ages after that, they turned their chief attention to the pastoral life, which afforded a less precarious subsistence. Till of late, agriculture in most parts of the Highlands made but little progress.

The Highlanders always enjoyed a king and government of their own, till Kenneth M'Alpine (anno 845), after having subdued the Pictish kingdom, transferred thither the seat of royalty. This event proved very unfavourable to the virtues of the Highlanders, which from this period began to decline. The country, no longer awed by the presence of the sovereign, fell into anarchy and confusion. The chieftains began to extend their authority, to form factions, and to foment divisions and feuds between contending clans. The laws were either too feeble to bind them, or too remote to take notice of them. Hence sprung all those evils which long disgraced the country, and disturbed the peace of its inhabitants. Robbery or plunder, provided it was committed on any one of an adverse clan or tribe, was countenanced and authorized; and their reprisals on one another were perpetual. Thus quarrels were handed down from one generation to another, and the whole clan were bound in honour to espouse the cause of every individual that belonged to it. By this means the genius of the people was greatly altered; and the Highlanders of a few ages back were almost as remarkable for their irregular and disorderly way of life as their predecessors were for their civilization and virtue. It is from not attending to this distinction between the ancient Highlanders and their posterity in later times, that many have doubted the existence of those exalted virtues ascribed by their poets to the more ancient inhabitants of the country. But now that the power of the chieftains is again abolished, law established, and property secured, the genius of the people (where it is not hindered by some other extraneous cause) begins again to show itself in its genuine colours; and many of their ancient virtues begin to shine with conspicuous lustre. Justice, generosity, honesty, friendship, peace, and love, are perhaps no where more cultivated than among this people. But one of the strongest features which marked the character of the Highlanders in every age, was their hospitality and benevolence to strangers. At night the traveller was always sure to find a hearty welcome in whatever house he should go to; and the host thought himself happier in giving the entertainment than the guest in receiving it. Even with regard to their enemies, the laws of hospitality were observed with the most sacred regard. They who fought against each other in the day, could join in the night feast, and even sleep together, in the same house. From the same principle, they were, in most other cases, so faithful to their trust, that they rarely betrayed any confidence reposed in them. A promise they thought as binding as an oath, and held it equally inviolable and sacred.

The Caledonians in all ages have been much addicted to poetry and music. The poems of Ossian, so universally repeated, and so highly esteemed by every Highlander, are a strong proof of the early proficiency of this people in the poetical art. Even to this day, notwithstanding the many disadvantages they labour under, the most illiterate of either sex discover frequently a genius for poetry, which often breaks forth in the most natural and simple strains, when love, grief, joy, or any other subject of song, demands it. Wherever their circumstances are so easy as to allow them any respite from toil, or any cheerfulness of spirits, a good portion of their time, especially of the winter nights, is still devoted to the song and tale. This last species of composition is chiefly of the novel-kind, and is handed down by tradition like their poems. It was the work of the bards; and proved, while they existed, no contemptible entertainment. But since the extinction of that order, both the Gaelic poems and tales are in a great measure either lost or adulterated.—The genius and character of the Gaelic poetry is well known. It is tender, simple, beautiful, and sublime.

Among the ancient Highlanders, the harp was the chief instrument of music. It suited the mildness of their manners, and was well adapted to the peace and quiet which they enjoyed under their own kings. In a later period, however, when the constant quarrels of their chiefs, and the endless feuds of contending clans, turned all their thoughts to war, it was forced to give place to the bag-pipe, an instrument altogether of the martial kind, and therefore well suited to the state of the country at that time. But ever since the cause which had brought this instrument in vogue has ceased to operate, the attention to it has been on the decline; so that the harp, with very little encouragement, might again resume the seat from which it was once expelled.—The most, and especially the oldest of the Highland music, having been composed to the harp, is of a soft, tender, and elegiac cast, as best suited to the genius of that instrument. These pieces are generally expressive of the passions of love and grief. Other pieces, which were composed in their state of war, and adapted to a different instrument, are altogether bold and martial. And many are of a sprightly and cheerful cast, the offspring of mirth, and the sport of fancy in the season of festivity. Many of these last are of the chorus kind; and are sung in almost all the exercises in which a number of people are engaged, such as rowing, reaping, felling, &c. The time of these pieces is adapted to the exercises to which they are respectively sung. They greatly forward the work, and alleviate the labour. The particular music which is generally used by the Highlanders in their dances is well known by the name of *Strathsley reels*.

The language of the Highlanders is still the Gaelic; which, with many of their customs and manners, has been secured to them by their mountains and fastnesses, amidst the many revolutions which the rest of the island has undergone in so long a course of ages. The Gaelic seems to be the oldest and purest dialect which remains of the Celtic, as appears from its approaching the nearest to the names of places, &c. which that language left in most countries where it prevailed, and from its most obvious affinity to those tongues, ancient or modern, which have been in any measure derived from the old Celtic. The Gaelic has all the marks of an original and primitive language. Most of the words are expressive of some property or quality of the objects which they denote. This, together with the variety of its sounds (many of which, especially of those that express the soft and mournful passions, are peculiar to itself), renders it highly adapted for poetry. It is generally allowed to have been the language of court, in Scotland, till the reign of Malcolm Canmore. The Gaelic epithet of *Can-more*, or "large head," by which this king is distinguished, seems to intimate so much. In some particular parliaments at least, it was spoken much

later, as in that held by Robert the Bruce at Ardehatten. That it has been formerly a good deal cultivated, appears from the style and complexion of its poems and tales, and from several ancient MSS. that have come down to the present times. To strangers the Gaelic has a forbidding aspect, on account of the number of its quiescent consonants (which are retained to mark the derivation of words and their variation in case and tense), but its sound is abundantly musical and harmonious, and its genius strong and masculine. Its alphabet consists of 18 letters, of which one is an aspirate, 12 are consonants, and five are vowels.

The Highlanders have begun of late years to apply to learning, agriculture, and especially to commerce, for which their country, every where indented with arms of the sea, is peculiarly favourable. Cattle is the chief staple of the country; but it produces more grain than would supply its inhabitants, if so much of it were not consumed in whisky. The natives are beginning to avail themselves of their mines, woods, wool, and fisheries; and by a vigorous application, with the due encouragement of government, may become a prosperous and useful people.

The Highlanders are of a quick and penetrating genius, strongly tinctured with a thirst of knowledge, which disposes them to learn any thing very readily. They are active, persevering, industrious, and economical. They are remarkably bold and adventurous, which qualifies them for being excellent seamen and soldiers. They are generally of a middle size, rather above it than otherwise; their eyes are lively, their features distinctly marked, and their persons strong and well made. Their countenance is open and ingenuous, and their temper frank and communicative.

HIGHMORE (Joseph, Esq.) an eminent painter, was born in the parish of St. James, Garlick-hitch, London, June 13, 1692, being the third son of Mr. Edward Highmore a coal-merchant in Thames-street. Having such an early and strong inclination to painting, that he could think of nothing else with pleasure, his father endeavoured to gratify him in a proposal to his uncle, who was serjeant-painter to king William, and with whom Mr. (afterwards Sir James) Thornhill had served his apprenticeship. But this was afterwards for good reasons declined, and he was articled as clerk to an attorney, July 18th 1707; but so much against his own declared inclination, that in about three years he began to form resolutions of indulging his natural disposition to his favourite art, having continually employed his leisure hours in designing, and in the study of geometry, perspective, architecture, and anatomy, but without any instructors except books. In fact, as might be expected, he arrived at great perfection and success in the exercise of his favourite art, and painted many pictures which were not only valued highly in his own time, but are now the objects of admiration to painters.

On the first institution of the academy of painting, sculpture, &c. in London, in the year 1753, he was elected one of the professors; an honour which, on account of his many avocations, he desired to decline. In 1754 he published "A critical examination of those two Paintings [by Rubens] on the Ceiling of the Banqueting house at Whitehall, in which Architecture is introduced, so far as relates to Perspective; together with the Discussion of a Question which has been the Subject of Debate among Painters:" printed in 4to. In the solution of this question, he proved that Rubens and several other great painters were mistaken in the practice, and Mr. Kirby and several other authors in the theory. And in the 17th volume of the Monthly Review, he animadverted (anonymously) on Mr. Kirby's unwarrantable treatment of Mr. Ware, and detected and exposed his errors, even when he exults in his own superior science. Of the many portraits which Mr. High-

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more painted, in a large practice of 46 years (of which several have been engraved), it is impossible and useless to discuss particulars. Some of the most capital in the historical branch, which was then much less cultivated than it is at present, shall only be mentioned, viz. "Hagar and Ishmael," a present to the Foundling-hospital: "The good Samaritan," painted for Mr. Shepherd of Campsey Ash: "The finding of Moses," purchased at his sale by colonel (now general) Lister: "The Harlowe family, as described in Clarissa," now in the possession of Thomas Watkinson Payler, Esq. at Heden in Kent: "Clarissa," the portrait mentioned in that work: "The Graces unveiling Nature," drawn by memory from Rubens: "The Clementina of Grandison, and the queen-mother of Edward IV. with her younger son, &c. in Westminster-abbey;" the three last in the possession of his son.

Mr. Highmore was the author of various publications which were well received; but his most capital work of the literary kind was his "Practice and Perspective, on the principles of Dr. Brook Taylor, &c." written many years before, but not published till 1763, in one vol. 4to. This not only evinced his scientific knowledge of the subject, but removed, by its perspicuity, the only objection that can be made to the system of Dr. Taylor. His "Epistle to an eminent Painter;" published in the Gentleman's Magazine for 1778, shows that his talents were by no means impaired at the age of 86. Indeed he retained them to the last, and had even strength and spirit sufficient to enable him to ride out daily on horseback the summer before he died. A strong constitution, habitual temperance, and constant attention to his health in youth as well as in age, prolonged his life, and preserved his faculties to his 88th year, when he declined gradually, and died March 3, 1780. He was interred in the south aisle of Canterbury cathedral, leaving one son, Anthony, educated in his own profession; and a daughter, named Susanna.

His abilities as a painter appear in his works, which will not only be admired by his contemporaries, but by their posterity; as his tints, like those of Rubens and Vandyck, instead of being impaired, are improved by time, which some of them have now withstood above 60 years. His idea of beauty, when he indulged his fancy, was of the highest kind; and his knowledge of perspective gave him great advantages in family-pieces, of which he painted more than any one of his time. He could take a likeness by memory as well as by a sitting, as appears by his picture of the duke of Lorraine (afterwards emperor), which Faber engraved; and those of king George II. (in York-assembly-room); queen Caroline, the two Miss Gunning, &c. Like many other great painters, he had "a poet for his friend," in the late Mr. Browne. There was likewise a poem addressed to him in 1726, by the Rev. Mr. Bunce, at that time of Trinity-hall, Cambridge, who succeeded Mr. Highmore, and in 1780 was vicar of St. Stephen's near Canterbury.

HIGHNESS, a quality or title of honour given to princes. The kings of England and Spain had formerly no other title but that of *highness*; the first till the time of James I. and the second till that of Charles V. The petty princes of Italy began first to be complimented with the title of *highness* in the year 1630. In France, the duke of Orleans assumed the title of *royal highness* in the year 1631, to distinguish himself from the other princes. The princes of the blood in England are each distinguished in the same way.

HIGHWORTH, a town of Wilts, with a market on Wednesday. It is seated on the top of a hill, which stands in a rich plain, near the vale of White Horse. It is 36 miles N. of Salisbury, and 77 W. of London.

HILARIA, in antiquity, feasts celebrated every year by the Romans on the 8th of the calends of April, or the 25th of March, in honour of Cybele the mother of the gods. The li-

laria were solemnized with great pomp and rejoicing. Every person dressed himself as he pleased, and took the marks or badges of whatever dignity or quality he had a fancy for. The statue of the goddess was carried in procession through the streets of the city, accompanied by multitudes in the most splendid attire. The day before the festival was spent in tears and mourning. Cybele represented the earth, which at this time of the year begins to feel the kindly warmth of the spring; so that this sudden transition from sorrow to joy was an emblem of the vicissitude of the seasons, which succeeded one another.

The Romans took this feast originally from the Greeks, who called it *ἀναστασις*, q. d. *ascensus*; the eve of that day they spent in tears and lamentations, and thence denominated it *καταστασις*, *descensus*. Afterwards, the Greeks took the name *ἡλάρια* from the Romans; as appears from Photius, in his extract of the life of the philosopher Isidore.

Casaubon maintains, that beside this particular signification, the word *hilaria* was also a general name for any joyful or festival day, whether public or private and domestic. But Salmasius does not allow of this. Tristram, tom. i. p. 482, distinguishes between *hilaria* and *hilarie*. The former, according to him, were public rejoicings; and the latter, prayers made in consequence thereof; or even of any private feast or rejoicing, as a marriage, &c. The public lasted several days; during which, all mourning and funeral ceremonies were suspended.

HILARIUS, an ancient father of the Christian church, who flourished in the 4th century. He was born, as St. Jerome informs us; at Poitiers, of a good family; who gave him a liberal education in the Pagan religion, and which he did not forsake till he was arrived at maturity. He was advanced to the bishopric of Poitiers in the year 355, according to Baronius; and became a most zealous champion for the orthodox faith, particularly against the Arians, who were at that time gaining ground in France. He assembled several councils there, in which the determinations of the synods of Rimini and Seleucia were condemned. He wrote a treatise concerning synods; and a famous work in 12 books on the Trinity, which is much admired by the orthodox believers. He died in the latter end of the year 367. His works have been many times published; but the last and best edition of them was given by the Benedictines at Paris in 1693.

HILARODI, in the ancient music and poetry, a sort of poets among the Greeks, who went about singing little gay poems or songs, somewhat graver than the Ionic pieces, accompanied with some instrument. From the streets they were at last introduced into tragedy, as the *magodi* were into comedy. They appeared dressed in white, and were crowned with gold. At first they wore shoes; but afterwards they assumed the *crepida*, being only a sole tied over with a strap.

HILARY-TERM. See TERM.

HILDBURGHAUSEN, a town of Germany, in a duchy of the same name, in the circle of Franconia and principality of Cobourg. It is seated on the Werra, and is a handsome well-built place, subject to the duke of Saxe-Hildburghausen, who has a palace here. It is 22 miles N. by W. of Cobourg. E. lon. 11. 3. N. lat. 50. 53.

HILDESHEIM, a strong town of Germany, in the circle of Lower Saxony, and bishopric of the same name. It is free and imperial; and in the cathedral is the statue of Herman, the celebrated German chief. It is divided into the old and new towns, each of which has its separate council; and its inhabitants are a mixture of Lutherans and Papists. It is seated on the Ilme, 17 miles S. S. E. of Hanover. E. lon. 10. 10. N. lat. 52. 10.

HILL, a term denoting any considerable eminence on the earth's surface. It is sometimes synonymous with the word *mountain*; though generally it denotes only the lesser eminences,

the word *mountain* being particularly applied to the very largest. See MOUNTAIN.

HILL (Aaron), a poet of considerable eminence, the son of a gentleman of Malmesbury-abbey in Wiltshire, was born in 1685. His father's imprudence having cut off his paternal inheritance, he left Westminster-school at 14 years of age; and embarked for Constantinople, to visit lord Paget the English ambassador there, who was his distant relation. Lord Paget received him with surprise and pleasure, provided him a tutor, and sent him to travel: by which opportunity he saw Egypt, Palestine, and a great part of the east; and returning home with his noble patron, visited most of the courts of Europe. About the year 1709 he published his first poem intitled *Camillus*, in honour of the earl of Peterborough who had been general in Spain; and being the same year made master of Drury-lane theatre, he wrote his first tragedy, *Elfred*, or the Fair Inconstant. In 1710 he became master of the opera-house in the Hay-market; when he wrote an opera called *Rinaldo*, which met with great success, being the first that Mr. Handel set to music after he came to England. Unfortunately for Mr. Hill, he was a projector as well as poet, and in 1715 obtained a patent for extracting oil from beech-nuts; which undertaking, whether good or bad, miscarried after engaging three years of his attention. He was also concerned in the first attempt to settle the colony of Georgia; from which he never reaped any advantage: and in 1728 he made a journey into the Highlands of Scotland, on a scheme of applying the woods there to ship-building; in which also he lost his labour. Mr. Hill seems to have lived in perfect harmony with all the writers of his time, except Mr. Pope, with whom he had a short paper-war, occasioned by that gentleman's introducing him in the *Dunciad*, as one of the competitors for the prize offered by the goddesses of Dullness, in the following lines:

"Then Hill essay'd; scarce vanish'd out of sight,
"He buoys up instant, and returns to light;
"He bears no token of the fabler streams,
"And mounts far off among the Swans of Thames."

This, though far the gentlest piece of satire in the whole poem, and conveying at the same time an oblique compliment, roused Mr. Hill to take some notice of it; which he did by a poem written during his peregrination in the north, intitled, "The progress of wit, a caveat for the use of an eminent writer;" which he begins with the following eight lines, in which Mr. Pope's too well-known disposition is elegantly, yet very severely characterized:

"Tuneful *Alexis* on the Thames' fair side,
"The Ladies' play-thing and the Muses' pride;
"With merit popular, with wit polite,
"Easy tho' vain, and elegant tho' light;
"Desiring and deserving others praise,
"Poorly accepts a Fame he ne'er repays:
"Unborn to cherish, sneakingly approves;
"And wants the soul to spread the worth he loves."

The *sneakingly approves*, in the last couplet, Mr. Pope was much affected by; and indeed through their whole controversy afterwards, in which it was generally thought that Mr. Hill had much the advantage, Mr. Pope seems rather to express his repentance by denying the offence, than to vindicate himself supposing it to have been given. Besides the above poems, Mr. Hill, among many others, wrote one, called *The Northern Star*, upon the actions of Czar Peter the Great; for which he was several years afterwards complimented with a gold medal from the empress Catharine, according to the Czar's desire before his death. He likewise altered some of Shakespear's plays, and translated some of Voltaire's. His last production was *Me-*

rope; which was brought upon the stage in Drury-lane by Mr. Garrick. He died on the 8th of February 1749, as it is said, in the very minute of the earthquake; and after his decease, four volumes of his works in prose and verse were published in octavo, and his dramatic works in two volumes.

HILL (Sir John), a voluminous writer, was originally bred an apothecary; but his marrying early, and without a fortune, made him very soon look round for other resources than his profession. Having, therefore, in his apprenticeship, attended the botanical lectures of the company, and being possessed of quick natural parts, he soon made himself acquainted with the theoretical as well as practical parts of botany; from whence being recommended to the late duke of Richmond and lord Petre, he was by them employed in the inspection and arrangement of their botanic gardens. Assisted by the liberality of these noblemen, he executed a scheme of travelling over the kingdom, to collect the most rare and uncommon plants; which he afterward published by subscription: but after great researches and uncommon industry, this undertaking turned out by no means adequate to his expectation. The stage next presented itself, as a soil in which genius might stand a chance of flourishing: but after two or three unsuccessful attempts, it was found he had no pretensions either to the sock or buskin; which once more reduced him to his botanical pursuits, and his business as an apothecary. At length, about the year 1746, he translated from the Greek a small tract, written by Theophrastus, on Gems, which he published by subscription; and which, being well executed, procured him friends, reputation, and money. Encouraged by this, he engaged in works of greater extent and importance. The first he undertook was A general natural history, in 3 vols. folio. He next engaged, in conjunction with George Lewis Scott, Esq. in furnishing a Supplement to Chambers's Dictionary. He at the same time started the British Magazine; and while he was engaged in a great number of these and other works, some of which seemed to claim the continued attention of a whole life, he carried on a daily essay, under the title of *Inspector*. Amidst this hurry of business, Mr. Hill was so laborious and ready in all his undertakings, and was withal so exact an economist of his time, that he scarcely ever missed a public amusement for many years: where, while he relaxed from the severer pursuits of study, he gleaned up articles of information for his periodical works. It would not be easy to trace Mr. Hill, now Dr. Hill (for he procured a diploma from the college of St. Andrew's), through all his various pursuits in life. A quarrel he had with the Royal Society, for being refused as a member, which provoked him to ridicule that learned body, in A review of the works of the Royal Society of London, 4to, 1751; together with his overwriting himself upon all subjects without reserve; made him sink in the estimation of the public nearly in the same pace as he had ascended. He found as usual, however, resources in his own invention. He applied himself to the preparation of certain simple medicines: such as the essence of water-dock, tincture of valerian, balsam of honey, &c. The well-known simplicity of these medicines made the public judge favourably of their effects, inasmuch that they had a rapid sale, and once more enabled the doctor to figure in that style of life ever so congenial to his inclination. Soon after the publication of the first of these medicines, he obtained the patronage of the earl of Bute, through whose interest he acquired the management of the royal gardens at Kew, with an handsome salary: and to wind up the whole of an extraordinary life, having, a little before his death, seized an opportunity to introduce himself to the knowledge of the king of Sweden, that monarch invested him with one of the orders of his court, which title he had not the happiness of enjoying above two years. He died toward the close of the year 1775.

HILLEL, senior, of Babylon, president of the sanhedrim of Jerusalem. He formed a celebrated school there, in which he maintained the oral traditions of the Jews against Shamai, his colleague, whose disciples adhered only to the written law; and this controversy gave rise to the sects of Pharisees and Scribes. He was likewise one of the compilers of the Talmud. He also laboured much at giving a correct edition of the sacred text; and there is attributed to him an ancient manuscript bible, which bears his name. He flourished about 30 years B. C. and died in a very advanced age.

HILLEL, the nasi, or prince, another learned Jew, the grandson of Judas Hakkadosh, or the Saint, the author of the Mishna, lived in the fourth century. He composed a cycle; and was one of the principal doctors of the Gemara. The greatest number of the Jewish writers attribute to him the correct edition of the Hebrew text which bears the name of *Hillel*, which we have already mentioned in the preceding article. There have been several other Jewish writers of the same name.

HILLIA, in botany; a genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking with those of which the order is doubtful. The calyx is hexaphyllous; the corolla cleft in six parts, and very long; the berry inferior, bilocular, and polyspermous.

HILLSBOROUGH, a borough, fair, and post-town, in the county of Down, and province of Ulster, 69 miles from Dublin. Here is a fine seat of the earl of Hillsborough. The town is pleasantly situated and almost new built, in view of Liffburn, Belfast, and Carrickfergus-bay; the church is magnificent, having an elegant spire, as lofty as that of St. Patrick's in Dublin, and seven painted windows. Here is an excellent inn, and a thriving manufacture of muslins. It has three fairs, and sends two members to parliament. This place gives title of earl to the family of Hillsborough. W. lon. 6. 20. N. lat. 54. 30.

HILUM, among botanists, denotes the eye of a bean.

HIMERA, in ancient geography, the name of two rivers in Sicily; one running northwards into the Tuscan sea, now called *Fiume di Termini*; and the other southwards into the Lybian; dividing Sicily into two parts, being the boundary between the Syracusans to the east and Carthaginians to the west; not rising from the same, but from different springs. HIMERA was also the name of a town of Sicily, at the mouth of the Himera, which ran northwards, on its left or west side. It was a colony of Zancle, and afterwards destroyed by the Carthaginians. (Diodorus Siculus.)

HIMERENSES THERMAE, in ancient geography, a town of Sicily, on the east side of that Himera which runs to the north. After the destruction of the town of Himera by the Carthaginians, such of the inhabitants as remained, settled in the same territory, not far from the ancient town, now called Termini. It was made a Roman colony by Augustus.

HIMMALEH-MOUNT, a vast chain of mountains in Asia, which extends from Cabul along the N. of Hindoostan, and appears to be the general boundary of Thibet, through the whole extent from the Ganges to the river Teesta; inclosing between it and Hindoostan, a tract of country, from 100 to 180 miles in breadth, divided into a number of small states, none of which are understood to be either tributaries or feudatories of Thibet; such as Sirinagur, Napaul, &c. This ridge was known to the ancients by the names of Imaus and the Indian Caucasus. The natives now call it Hindoo-Ko (the Indian mountains) as well as Himmaleh; which last is a Sanscrit word, signifying *snowy*; its summit being covered with snow. See GANGES and GOGRA.

HIN, a Hebrew measure of capacity for things liquid, containing the sixth part of an ephah, or one gallon two pints English measure.

HINCHINBROOK ISLAND, one of the New Hebrides in the South Pacific Ocean. E. lon. 168. 33. S. lat. 17. 25.

HINCKLEY, a town of Leicestershire, with a market on Monday. It is adorned with a large handsome church, which has a lofty spire. Hinckley has a considerable stocking manufactory, and is 12 miles S. W. of Leicester, and 91 N. N. W. of London. W. lon. 1. 20. N. lat. 52. 34.

HIND, a female stag in the third year of its age. See CERVUS.

HINDELOPEN, or HINLOPEN, a seaport of the United Provinces, in Friesland, seated on the Zuider-Zee, between Stavoren and Worcum.

HINDON, a small town of Wiltshire in England, which sends two members to parliament. It is situated in E. lon. 2. 14. N. lat. 51. 12.

HINDOOS, or GENTOOS, the inhabitants of that part of India known by the name of *Hindooistan*, or the *Mogul's empire*, who profess the religion of the Bramins, supposed to be the same with that of the ancient Gymnosophists of Ethiopia.

From the earliest period of history these people seem to have maintained the same religion, laws, and customs, which they do at this day: and indeed they and the Chinese are examples of perseverance in these respects altogether unknown in the western world. In the time of Diodorus Siculus they are said to have been divided into seven *casts* or tribes; but the intercourse betwixt Europe and India was in his time so small, that we may well suppose the historian to have been mistaken, and that the same tenacity for which they are so remarkable in other respects has manifested itself also in this. At present they are divided only into four tribes; 1. The Bramin; 2. The Khatry; 3. The Bhyse; and, 4. The Soodera. All these have distinct and separate offices, and cannot, according to their laws, intermingle with each other; but for certain offences they are subject to the loss of their cast, which is reckoned the highest punishment they can suffer; and hence is formed a kind of fifth cast named *Pariahs* on the coast of Coromandel, but in the Sanscrit or sacred language *Chandalas*. These are esteemed the dregs of the people, and are never employed but in the meanest offices. There is besides a general division which pervades the four casts indiscriminately; and which is taken from the worship of their gods *Vishnou* and *Sheevab*; the worshippers of the former being named *Vishnou-bukht*; of the latter, *Sheevab-lukht*.

Of these four casts the bramins are accounted the foremost in every respect; and all the laws have such an evident partiality towards them, as cannot but induce us to suppose that they have had the principal hand in framing them. They are not, however, allowed to assume the sovereignty; the religious ceremonies and the instruction of the people being their peculiar province. They alone are allowed to read the *Veda* or sacred books; the *Khatrics*, or cast next in dignity, being only allowed to hear them read; while the other two can only read the *Saftras*, or commentaries upon them. As for the poor Chandalas, they dare not enter a temple, or be present at any religious ceremony.

In point of precedency the bramins claim a superiority even to the princes; the latter being chosen out of the Khatry or second cast. A rajah will receive with respect the food that is prepared by a brahman, but the latter will eat nothing that has been prepared by any member of an inferior cast. The punishment of a bramini for any crime is much milder than if he had belonged to another tribe; and the greatest crime that can be committed is the murder of a bramini. No magistrate must *desire* the death of one of these sacred persons, or cut off one of his limbs. They must be readily admitted into the presence even of princes whenever they please: when passengers in a boat, they must be the first to enter and to go out; and the wa-

terman must besides carry them for nothing; every one who meets them on the road being likewise obliged to give place to them.

All the priests are chosen from among this order, such as are not admitted to the sacerdotal function being employed as secretaries and accountants. These can never afterwards become priests, but continue to be greatly revered by the other casts.

The Khatry, or second cast, are those from among whom the sovereigns are chosen. The Bhyse or Banians, who constitute the third cast, have the charge of commercial affairs; and the Soodera, or fourth cast, the most numerous of all, comprehend the labourers and artisans. These last are divided into as many classes as there are followers of different arts; all the children being invariably brought up to the profession of their fathers, and it being absolutely unlawful for them ever to alter it afterwards.

No Hindoo is allowed to quit the cast in which he was born upon any account. All of them are very scrupulous with regard to their diet; but the bramins much more so than any of the rest. They eat no flesh, nor shed blood; which we are informed by Porphyry and Clemens Alexandrinus was the case in their time. Their ordinary food is rice and other vegetables, dressed with *ghre* (a kind of butter melted and refined so as to be capable of being kept for a long time), and seasoned with ginger and other spices. The food which they most esteem, however, is milk as coming from the cow; an animal for which they have the most extravagant veneration, inasmuch that it is enacted in the code of Gentoo laws, that any one who exacts labour from a bullock that is hungry or thirsty, or that shall oblige him to labour when fatigued or out of season, is liable to be fined by the magistrates. The other casts, though less rigid, abstain very religiously from what is forbidden them: nor will they eat any thing provided by a person of an inferior cast, or by one of a different religion. Though they may eat some kinds of flesh and fish, yet it is counted a virtue to abstain from them all. None of them are allowed to taste intoxicating liquor of any kind. Quintus Curtius indeed mentions a sort of wine made use of by the Indians in his time; but this is supposed to have been no other than toddy, or the unfermented juice of the cocoa-nut. This, when fermented, affords a spirit of a very unwholesome quality; but it is drunk only by the Chandalas and the lower class of Europeans in the country. So exceedingly bigoted and superstitious are they in their absurd maxims with regard to meat and drink, that some Sepoys in a British ship having expended all the water appropriated to their use, would have suffered themselves to perish for thirst rather than taste a drop of that which was used by the ship's company.

The religion of the Hindoos, by which these maxims are inculcated, and by which they are made to differ so much from other nations, is contained in certain books named *Veda*, *Vedams*, or *Beds*, written in a language called *Sanscrit*, which is now known only to the learned among them. The books are supposed to have been the work, not of the supreme God himself, but of an inferior deity named Brimha. They inform us, that Brama, or Brahma, the supreme God, having created the world by the word of his mouth, formed a female deity named Bawaney, who in an enthusiasm of joy and praise brought forth three eggs. From these were produced three male deities, named *Brimha*, *Vishnou*, and *Sheevab*. Brimha was endowed with the power of creating the things of this world, Vishnou with that of cherishing them, and Sheevab with that of restraining and correcting them. Thus Brimha became the creator of man; and in this character he formed the four casts from different parts of his own body, the Bramins from his mouth, the Khatry from his arms, the Banians from

his belly and thighs, and the Soodera from his feet. Hence, say they, these four different casts derive the different offices assigned them, the Bramins to teach; the Khatry to defend and govern; the Banians to enrich by commerce and agriculture; and the Soodera to labour, serve, and obey. Brama himself endowed mankind with passions, and understanding to regulate them; while Brimha, having created the inferior beings, proceeded to write the Vedans, and delivered them to be read and explained by the Bramins.

The religion of the Hindoos, though involved in superstition and idolatry, seems to be originally pure; inculcating the belief of an eternal and omnipotent Being; their subordinate deities Brimha, Vishnou, and Sheevah, being only representatives of the wisdom, goodness, and power, of the supreme God Brama. All created things they suppose to be *types* of the attributes of Brama, whom they call the *principle of truth*, the *spirit of wisdom*, and the *supreme being*; so that it is probable that all their idols were at first only designed to represent these attributes.

There are a variety of sects among the Hindoos; two great classes we have mentioned already, *viz.* the worshippers of Vishnou and those of Sheevah; and these distinguish themselves remarkably, the former by painting their faces with an horizontal line, the latter by a perpendicular one. There is, however, very little difference in point of religion between these or any other Hindoo sects. All of them believe in the immortality of the soul, a state of future rewards and punishments, and transmigration. Charity and hospitality are inculcated in the strongest manner, and exist among them not only in theory but in practice. "Hospitality (say they) is commanded to be exercised even towards an enemy, when he cometh into thine house; the tree doth not withdraw its shade even from the wood-cutter. Good men extend their charity even to the vilest animals. The moon doth not withhold her light even from the Chandalah." These pure doctrines, however, are intermixed with some of the vilest and most absurd superstitions; and along with the true God they worship a number of inferior ones, each distinguished by a name indicative of his particular attribute.

But besides these inferior deities, the Hindoos have a multitude of *demigods*, who are supposed to inhabit the air, the earth, and the waters, and in short the whole world; so that every mountain, river, wood, town, village, &c. has one of these tutelar deities, as was the case among the western heathens. By nature these demigods are subject to death, but are supposed to obtain immortality by the use of a certain drink named *Amrut*. Their exploits in many instances resemble those of Bacchus, Hercules, Theseus, &c. and in a beautiful epic poem named *Rancyun*, we have an account of the wars of Rain, one of the demigods, with Ravana tyrant of Ceylon.

All these deities are worshipped, as in other countries, by going to their temples, fasting, prayers, and the performance of ceremonies to their honour. They pray thrice a day, at morning, noon, and evening, turning their faces towards the east. They use many ablutions, and, like the Pharisees of old, they always wash before meals. Running water is always preferred for this purpose to such as stagnates. Fruits, flowers, incense, and money, are offered in sacrifice to their idols; but for the dead they offer a kind of cake named *Peenda*; and offerings of this kind always take place on the day of the full moon. Nothing sanguinary is known in the worship of the Hindoos at present, though there is a tradition that it was formerly of this kind; nay, that even human sacrifices were made use of: but if such a custom ever did exist, it must have been at a very distant period. Their sacred writings indeed make mention of bloody sacrifices of various kinds, not excepting even those of the human race: but so many peculiarities are mentioned with regard to the proper victims, that it is almost impossible to find

them. The only instance of bloody sacrifices we find on record among the Hindoos, is that of the buffalo to Bawaney, the mother of the gods.

Among the Hindoos there are two kinds of worship, distinguished by the name of the worship of the *invisible God* and of *idols*. The worshippers of the invisible God are, strictly speaking, deists: the idolaters perform many absurd and unmeaning ceremonies, too tedious to mention, all of which are conducted by a Bramin; and during the performance of these rites, the dancing-women occasionally perform in the court, singing the praises of the Deity in concert with various instruments. All the Hindoos seem to worship the fire; at least they certainly pay a great veneration to it. Bishop Wilkins informs us, that they are enjoined to light up a fire at certain times, which must be produced by the friction of two pieces of wood of a particular kind; and the fire thus produced is made use of for consuming their sacrifices, burning the dead, and in the ceremonies of marriage.

Great numbers of *devotees* are to be met with every where through Hindoostan. Every cast is allowed to assume this way of life excepting the Chandalahs, who are excluded. Those held most in esteem are named *Senioffes* and *Yogey*s. The former are allowed no other clothing but what suffices for covering their nakedness, nor have they any worldly goods besides a pitcher and staff; but though they are strictly enjoined to meditate on the truths contained in the sacred writings, they are expressly forbidden to argue about them. They must eat but once a day, and that very sparingly, of rice or other vegetables; they must also show the most perfect indifference about hunger, thirst, heat, cold, or any thing whatever relative to this world; looking forward with continual desire to the separation of the soul from the body. Should any of them fail in this extravagant self-denial, he is rendered so much more criminal by the attempt, as he neglected the duties of ordinary life for those of another which he was not able to accomplish. The Yogey are bound to much the same rules, and both subject themselves to the most extravagant penances. Some will keep their arms constantly stretched over their heads till they become quite withered and incapable of motion; others keep them crossed over their breast during life; while others, by keeping their hands constantly shut, have them quite pierced through by the growth of their nails. Some chain themselves to trees or particular spots of ground, which they never quit; others resolve never to lie down, but sleep leaning against a tree: but the most curious penance perhaps on record is that of a Yogey, who measured the distance between Benares and Jaggernaut with the length of his body, lying down and rising alternately. Many of these enthusiasts will throw themselves in the way of the chariots of Vishnou or Sheevah, which are sometimes brought forth in procession to celebrate the feast of a temple, and drawn by several hundreds of men. Thus the wretched devotees are in an instant crushed to pieces. Others devote themselves to the flames, in order to show their regard to some of their idols, or to appease the wrath of one whom they suppose to be offended.

A certain set of devotees are named *Pandarams*; and another on the coast of Coromandel are named *Cary-Patra Pandarams*. The former rub themselves all over with cow-dung, running about the country singing the praises of the god Sheevah whom they worship. The latter go about asking charity at doors by striking their hands together, for they never speak. They accept of nothing but rice; and when they have got as much as will satisfy their hunger, never give themselves any trouble about more, but pass the rest of the day in the shade, in a state of such supine indolence as scarce to look at any object whatever. The Tadinums are another set of mendicants, who sing the incarnations of Vishnou. They have hollow brass rings

round their ankles, which they fill with pebbles; so that they make a considerable noise as they walk; they beat likewise a kind of tabor.

The greatest singularity in the Hindoo religion, however, is, that so far from persecuting those of a contrary persuasion, which is too often the case with other professors, they absolutely refuse even to admit of a profelyte. They believe all religions to be equally acceptable to the Supreme Being: assigning as a reason, that if the Author of the universe preferred one to another, it would have been impossible for any other to have prevailed than that which he approved. Every religion, therefore, they conclude to be adapted to the country where it is established; and that all in their original purity are equally acceptable.

Among the Hindoos, *marriage* is considered as a religious duty; and parents are strictly commanded to marry their children by the time they arrive at eleven years of age at farthest. Polygamy is allowed; but this licence is seldom made use of, unless there should be no children by the first wife. In case the second wife also proves barren, they commonly adopt a son from among their relations.

The Hindoos receive no dower with their wives; but, on the contrary, the intended husband makes a present to the father of his bride. Nevertheless, in many cases, a rich man will choose a poor relation for his daughter; in which case the bride's father is at the expence of the wedding, receives his son-in-law into his house, or gives him a part of his fortune. The bridegroom then quits the dwelling of his parents with certain ceremonies, and lives with his father-in-law. Many formalities take place between the parties even after the match is fully agreed upon; and the celebration of the marriage is attended with much expence; magnificent processions are made, the bride and bridegroom sitting in the same palankeen, attended by their friends and relations; some riding in palankeens, some on horses, and others on elephants. So great is their vanity indeed on this occasion, that they will borrow or hire numbers of these expensive animals to do honour to the ceremony. The rejoicings last several days; during the evenings of which, fireworks and illuminations are displayed, and dancing-women perform their feats; the whole concluding with alms to the poor, and presents to the Bramins and principal guests, generally consisting of shawls, pieces of muslin, and other cloths. A number of other ceremonies are performed when the parties come of age, and are allowed to cohabit together. The same are repeated when the young wife becomes pregnant; when she passes the seventh month without any accident; and when she is delivered of her child. The relations assemble on the tenth day after the birth, to assist at the ceremony of naming the child; but if the bramins be of opinion that the aspect of the planets is at that time unfavourable, the ceremony is delayed, and prayers offered up to avert the misfortune. When the lucky moment is discovered, they fill as many pots with water as there are planets, and offer a sacrifice to them; afterwards they sprinkle the head of the child with water, and the brammin gives it such a name as he thinks best adapted to the time and circumstances; and the ceremony concludes with prayers, presents to the bramins, and alms to the poor. Mothers are obliged to suckle their own children; nor can this duty be dispensed with except in case of sickness. New ceremonies, with presents to the bramins, take place, when a boy comes of age to receive the string which the three first casts wear round their waist.

Boys are taught to read and write by the bramins, who keep *schools* for that purpose throughout the country. They use leaves instead of books, and write with a pointed iron instrument. The leaves are generally those of the palm-tree, which being smooth and hard, and having a thick substance, may be kept for almost any length of time, and the letters are not sub-

ject to grow faint or be effaced. The leaves are cut into slips about an inch broad, and their books consist of a number of these tied together by means of a hole in one end. Sometimes the letters are rubbed over with a black powder, to render them more legible. When they write upon paper, they make use of a small reed. Sometimes they are initiated in writing by making letters upon sand strewed on the floor; and they are taught arithmetic by means of a number of small pebbles. The education of the girls is much more limited; seldom extending farther than the articles of their religion.

Among these people the custom of *burning the dead* prevails universally; and the horrid practice of wives burning themselves along with their deceased husbands was formerly very common, though now much less so. At present it is totally prohibited in the British dominions; and even the Mohammedans endeavour to discountenance a practice so barbarous, though many of their governors are accused of conniving at it through motives of avarice. At present it is most common in the country of the Rajahs, and among women of high rank.

This piece of barbarity is not enjoined by any law existing among the Hindoos; it is only said to be *proper*, and rewards are promised in the next world to those who do so. But though a wife chooses to outlive her husband, she is in no case whatever permitted to marry again, even though the marriage with the former had never been completed. It is unlawful for a woman to burn herself if she be with-child at the time of her husband's decease, or if he died at a distance from her. In the latter case, however, she may do so if she can procure his girdle or turban to be put on the funeral pile along with her. These miserable enthusiasts, who devote themselves to this dreadful death, suffer with the greatest constancy; and Mr. Holwel gives an account of one who, being told of the pain she must suffer (with a view to dissuade her), put her finger into the fire and kept it there for a considerable time; after which she put fire on the palm of her hand, with incense upon it, and fumigated the bramins who were present. Sometimes a chapel is erected on the place where one of these sacrifices has been performed; sometimes it is inclosed, flowers planted upon it, and images set up. In some few places the Hindoos bury their dead; and some women have been known to suffer themselves to be buried alive with their deceased husbands: but the instances of this are still more rare than those of burning. No woman is allowed any inheritance among the Hindoos; so that if a man dies without male issue, his estate goes to his adopted son, or to his nearest relation.

The Hindoos, though naturally mild and timid, will on many occasions meet death with the most heroic intrepidity. An Hindoo who lies at the point of death, will talk of his decease with the utmost composure, and if near the river Ganges, will desire to be carried out, that he may expire on its banks. Such is the excessive veneration they have for their religion and customs, that no person will infringe them even to preserve his own life. An Hindoo, we are told, being ill of a putrid fever, was prevailed upon to send for an European physician, who prescribed him the bark in wine; but this was refused with the greatest obstinacy even to the very last, though the governor himself joined in his solicitations, and in other matters had a considerable influence over him. In many instances these people, both in ancient and modern times, have been known, when closely besieged by an enemy whom they could not resist, to kill their wives and children, set fire to their houses, and then violently rush upon their adversaries till every one was destroyed. In the late war, some Sepoys in the British service, having been concerned in a mutiny, were condemned to be blown away from the mouths of cannon. Some grenadiers cried out, that as they had all along had the post of honour, they saw no reason why they should be denied it now; and therefore desired that they might

be blown away first. This being granted, they walked forward to the guns with composure, begged that they might be spared the indignity of being tied, and, placing their breasts close to the muzzles, were shot away. The commanding officer was so much affected with this instance of heroism, that he pardoned all the rest.

In ordinary life, the Hindoos are cheerful and lively; fond of conversation and amusements, particularly dancing. They do not, however, learn or practise dancing themselves, but have women taught for the purpose; and in beholding these they will spend whole nights. They disapprove of many parts of the education of European ladies, as supposing that they engage the attention too much, and draw away a woman's affection from her husband and children. Hence there are few women in Hindoostan who can either read or write. In general they are finely shaped, gentle in their manners, and have soft and even musical voices. The women of Kashmere, according to Mr. Forster, have a bright olive complexion, fine features, and delicate shape; a pleasing freedom in their manners, without any tendency to immodesty.

The *dress* of the modest women in Hindoostan consists of a close jacket, which covers their breasts, but perfectly shows their form. The sleeves are tight, and reach half way to the elbows, with a narrow border painted or embroidered all round the edges. Instead of a petticoat, they have a piece of white cotton cloth wrapped round the loins, and reaching near the ankle on the one side, but not quite so low on the other. A wide piece of muslin is thrown over the right shoulder; which, passing under the left arm, is crossed round the middle, and hangs down to the feet. The hair is usually rolled up into a knot or bunch towards the back part of the head; and some have curls hanging before and behind the ears. They wear bracelets on their arms, rings in their ears, and on their fingers, toes and ankles; with sometimes a small one in the nostril.

The dress of the dancing-women, who are deemed votaries of Venus, is very various. Sometimes they wear a jama, or long robe of wrought muslin, or gold and silver tissue; the hair plaited and hanging down behind, with spiral curls on each side of the face. They are taught every accomplishment which can be supposed to captivate the other sex, form a class entirely different from the rest of the people, and live by their own rules. Their clothes, jewels, and lodging, are considered as implements of their trade, and must be allowed them in cases of confiscation for debt: they may drink spirituous liquors, and eat any kind of meat except beef: their dances are said to resemble pretty exactly those of the ancient Bacchanians represented in some of the ancient paintings and bas reliefs. In some of their dances they attach gold and silver bells to the rings of the same metals they wear on their ankles.

The men generally shave their heads and beards, leaving only a pair of small whiskers and a lock on the back part of their head, which they take great care to preserve. In Kashmere and some other places, they let their beards grow to the length of two inches. They wear turbans on their heads; but the bramins, who officiate in the temples, commonly go with their heads uncovered, and the upper part of the body naked: round their shoulders they hang the sacred string called *Zennar*, made of a kind of perennial cotton, and composed of a certain number of threads of a determined length. The Khatris wear also a string of this kind, but composed of fewer threads; the Bhyse have one with still fewer threads, but the Sooderas are not allowed to wear any string. The other dress of the bramins consists of a piece of white cotton cloth wrapped about the loins, descending below the knee, but lower on the left than on the right side. In cold weather they sometimes put a red cap on their heads, and wrap a shawl round their bodies. The Kha-

tries, and most other of the inhabitants of this country, wear also pieces of cotton cloth wrapped round them, but which cover the upper as well as the lower part of the body. Earrings and bracelets are worn by the men as well as women; and they are fond of ornamenting themselves with diamonds, rubies, and other precious stones, when they can procure them. They wear slippers on their feet of fine woollen cloth or velvet, frequently embroidered with gold and silver; those of princes being sometimes adorned with precious stones. The lower classes wear sandals or slippers of coarse woollen cloth or leather. These slippers are always put off on going into any apartment, being left at the door, or given to an attendant; nevertheless the Hindoos make no complaints of the Europeans for not putting off their shoes when they come into their houses, which must certainly appear very uncouth to them.

Hindoo families are always governed by the eldest male, to whom great respect is shown. Filial veneration is carried to such an height among them, that a son will not sit down in the presence of his father until ordered to do so: and Mr. Forster observes, that during the whole time of his residence in India, he never saw a direct instance of undutifulness to parents; and the same is related by other writers.

The *houses* of the Hindoos make a worse appearance than could be supposed from their ingenuity in other respects. In the southern parts of the country, the houses are only of one story. On each side of the door, towards the street, is a narrow gallery covered by the slope of the roof which projects over it, and which, as far as the gallery extends, is supported by pillars of brick or wood. The floor of this gallery is raised about 30 inches above the level of the street; and the porters, or bearers of palankeens, with the foot-soldiers named *Peons*, who commonly hire themselves to noblemen, often lie down in this place. This entrance leads into a court, which is also surrounded by a gallery like the former. On one side of the court is a large room, on a level with the floor of the gallery; open in front, and spread with mats and carpets covered with white cotton cloth, where the master of the house receives visits and transacts business. From this court there are entrances by very small doors to the private apartments. In the northern parts, houses of two or three stories are commonly met with. Over all the country also we meet with the ruins of palaces, which evidently show the magnificence of former times.

The bramins of India were anciently much celebrated for their *learning*, though they now make a very inconsiderable figure in comparison with the Europeans. According to Philostratus, the Gymnosophists of Ethiopia were a colony of bramins, who, being obliged to leave India on account of the murder of their king near the banks of the Ganges, migrated into that country. The ancient bramins, however, may justly be supposed to have cultivated science with much greater success than their descendants can boast of, considering the ruinous wars and revolutions to which the country has been subjected. Metaphysics, as well as moral and natural philosophy, appear to have been well understood among them; but at present all the Hindoo knowledge is confined to those whom they call *Pundits*, "doctors or learned men." These only understand the language called *Sanscrit* or *Sarserit*, (from two words signifying perfection); in which the ancient books were written.

The *metaphysics* of the bramins is much the same with that of some ancient Greek philosophers. They believe the human soul to be an emanation from the Deity, as light and heat from the sun. Gowtama, an ancient metaphysician, distinguishes two kinds of souls, the divine and vital. The former resembles the eternal spirit from which it came, is immaterial, indivisible, and without passions; the vital soul is a subtle element

which pervades all things, distinct from organized matter, and which is the origin of all our desires. The external senses, according to this author, are representations of external things to the mind, by which it is furnished with materials for its various operations; but unless the mind act in conjunction with the senses, the operation is lost, as in that absence of mind which takes place in deep contemplation. He treats likewise of reason, memory, perception, and other abstract subjects. He is of opinion, that the world could not exist without a first cause; chance being nothing but the effect of an unknown cause: he is of opinion, however, that it is folly to make any conjectures concerning the beginning or duration of the world. In treating of providence, he denies any immediate interposition of the Deity; maintaining that the Supreme Being having created the system of nature, allowed it to proceed according to the laws originally impressed upon it, and man to follow the impulse of his own desires, restrained and conducted by his reason. His doctrine concerning a future state is not different from what we have already stated as the belief of the Hindoos in general. According to bishop Wilkins, many of them believe that this world is a state of rewards and punishments as well as of probation; and that good or bad fortune are the effects of good or evil actions committed in a former state.

The science for which the bramins, however, were most remarkable, is that of *astronomy*; and in this their progress was so great, as even yet to furnish matter of admiration to the moderns. See the article BANARES.

The progress of the Hindoos in *geometry* as well as astronomy has been very great in ancient times. Of this a most remarkable instance is given by Dr. Playfair, in their finding out the proportion of the circumference of a circle to its diameter to a great degree of accuracy. This is determined, in the *Ayeen Akbary*, to be as 3927 to 1250; and which to do it arithmetically in the simplest manner possible, would require the inscription of a polygon 768 sides; an operation which cannot be performed without the knowledge of some very curious properties of the circle, and at least nine extractions of the square root, each as far as ten places of decimals. This proportion of 1250 to 3927 is the same with that of 1 to 3.1416; and differs very little from that of 113 to 155 discovered by Metrus. He and Vieta were the first who surpassed the accuracy of Archimedes in the solution of this problem; and it is remarkable that these two mathematicians flourished at the very time that the *Ayeen Akbary* was composed among the Hindoos. In geography, however, they are much deficient; and it is very difficult to find out the true situation of the meridians mentioned by their authors from what they have said concerning them.

The art of *painting* among the Hindoos is in an imperfect state; nor are there any remains of antiquity which evince its ever having been more perfect than it is now. Their principal defect is in drawing, and being almost totally ignorant of the rules of perspective. They are much better skilled in colouring; and some of their pictures are finished with great nicety. Their *sculptures* are likewise rude, and greatly resemble those of the Egyptians. They seem to follow no regular rules in architecture: their temples indeed are filled with innumerable columns, but most of them without any just shape or proportion. They are principally remarkable for their immense size, which gives them an air of majesty and grandeur.

The *music* of the Hindoos is but little known to Europeans; and the art seems to have made but little progress among them in comparison with what it has done in the western countries; though some of the Indian airs are said to be very melodious. Their musical instruments are very numerous: in war they use a kind of great kettle drum named *nagar*, carried by a camel,

and sometimes by an elephant. The dolo is a long narrow drum slung round the neck; and the tam-tam is a flat kind of drum resembling a tabor, but larger and louder. They use also the cymbal, which they name *talan*; and they have various sorts of trumpets, particularly a great one named *tary*, which emits a most doleful sound, and is always used at funerals, and sometimes to announce the death of persons of distinction.

The *jugglers* among the Hindoos are so expert, that many of the missionaries have ascribed their tricks to supernatural power; and even so late a traveller as Mr. Grose seems to be not of a very different opinion. Like the Egyptians, they seem to have the power of disarming serpents of their poison; and there are many strollers who go about with numbers of these animals in bags, having along with them a small bagpipe called *magouty*, which they pretend is useful to bring them from their lurking-places. They take the serpents, though of the most poisonous kinds, out of the bags with their naked hands, and throw them on the ground, where they are taught to rear and move about to the sound of their music. They say that this is accomplished by means of certain incantations.

The use of *fire-arms* appears to have been of great antiquity in India. They are prohibited by the code of Gentoo laws, which is certainly of a very ancient date. The phrase by which they are denominated is *agneeasther*, or weapons of fire; and there is mention made of *shet agnee*, or the weapon that kills an hundred men at once. It is impossible to guess at the time when those weapons were invented among the Hindoos; but we are certain, that in many places of the east, which have neither been frequented by Mohammedans nor Europeans, rockets are almost universally made use of as weapons of war. The Hindoo books themselves ascribe the invention of fire-arms to *Baeshhookerma*, who formed all the weapons made use of in a war betwixt the good and evil spirits. Fire-balls, or blue lights, employed in besieged places in the night-time, to observe the motions of the besiegers, are met with every where through Hindoostan, and are constructed in full as great perfection as in Europe. Fire-works also are met with in great perfection; and, from the earliest ages, have constituted a principal article of amusement among the Hindoos. Gun-powder, or a composition somewhat resembling it, has been found in many other places of the east, particularly China, Pegu, and Siam; but there is reason to believe that the invention came originally from Hindoostan. Poisoned weapons of all kinds are forbidden in this country.

The Hindoos are remarkable for their *ingenuity* in all kinds of handicraft; but their utensils are simple, and in many respects inconvenient, so that incredible labour and patience are necessary for the accomplishment of any piece of work; and for this the Hindoos are very remarkable. Lacquering and gilding are used all over the country, and must have been used in very early ages; though in some places the lacquering is brought to much greater perfection than in others.

The principal article of *food* throughout all Hindoostan is rice, and of consequence the cultivation of it forms the principal object of agriculture. In this the most important requisite is plenty of water; and when there happens to be a scarcity in this respect, a famine must be the consequence. To prevent this as far as possible, a vast number of tanks and water-courses are to be met with throughout the country, though in some places these are too much neglected, and gradually going to decay. After the rice is grown to a certain length, it is pulled up, and transplanted into fields of about 100 yards square, separated from each other by ridges of earth; which are daily supplied with water let in upon them from the neigh-

bouring tanks. When the water happens to fall below the level of the channels made to receive it, it is raised by a simple machine named *picoti*, the construction of which is as follows. A piece of timber is fixed upright in the ground, and forked so as to admit another piece to move transversely in it by means of a strong pin. The transverse timber is flat on one side, and has pieces of wood across it in the manner of steps. At one end of this timber there is a large bucket, at the other a weight. A man walking down the steps throws the bucket into the well or tank; by going up, and by means of the weight, he raises it; and another person standing below empties it into a channel made to convey the water into the fields. The man who moves the machine may support himself by long bamboos that are fixed in the way of a railing from the top of the piece of upright timber towards the wall.

A number of other kinds of grain are to be met with in Hindoostan, but wheat is not cultivated farther south than 18° latitude. It is imported, however, to every part of the country by the *Banjaries*. These are a set of people belonging to no particular cast, who live in tents, and travel in separate bodies, each of which is governed by its own particular regulations. They frequently visit towns on the sea-coast, with bullocks loaded with wheat and other articles; carrying away, in exchange, spices, cloths, but especially salt, which they carry into the inland parts of the country. Some of their parties have several thousand of oxen belonging to them. They are rarely molested, even in time of war, otherwise than by being sometimes pressed into the service of an army to carry baggage or provisions; but for this they are paid, and dismissed as soon as the service is over. The Hindoos themselves are prohibited from going out of the country, under the severest of all penalties, that of losing their cast. Notwithstanding this, however, it is certain that they do settle in foreign parts in the character of merchants and bankers. Perhaps these may have a toleration from the principal bramin, or there may be an exemption for people of their profession; but this is not known. At any rate, wherever they go, they appear inviolably attached to their religious ceremonies, and refuse to eat what is prohibited to them in their own country. The *Ryots*, or people who cultivate the ground, are in many places in the most miserable situation; their only food being some coarse rice and pepper, for which they are obliged to endure all the inclemencies of a burning sun, and the inconveniences which attend alternately wading in water and walking with their bare feet on the ground heated intensely by the solar rays; by which they are frequently blistered in a miserable manner. All this, however, they submit to with the utmost patience, and without making any complaint, expecting to be released from their sufferings by death; though even then their religion teaches them to hope for nothing more than what they call *absorption into the essence of the Deity*; a state almost synonymous with what we call *annihilation*.

HINDOOSTAN, a celebrated and extensive country of Asia, bounded on the north by the Great and Little Thibet; on the south, by the hither peninsula of India, part of the Indian Sea, and Bay of Bengal; on the west, by Persia; and on the east, by Thibet and the farther peninsula. It is situated between 84° and 102° of east longitude, and between 21° and 36° of north latitude; being in length about 1204 miles, and in breadth 960; though in some places much less. This country was in early times distinguished among the Greeks by the name of *India*, the most probable derivation of which is from *Hind* the Persian name. We are assured by Mr. Wilkins, that no such words as *Hindoo* or *Hindoostan* exist in the Sanscrit or learned language of the country; in which it is named *bharata*, a word totally unknown to Europeans. The vast country of Hindoostan is at present divided among the following powers.

1. *Timur Shah*, son of *Ahmed Shah*, or *Abdallah*, possesses

an extent of territory to the north westward before we come to the river Indus. This country, extending all the way betwixt India and Persia, is known by the name of *Duran*, or *Turan*; and was possessed by the Afghans, of whom *Abdallah* became the sovereign. He was descended from an illustrious family; and having the misfortune of being taken prisoner by *Hussain Khan*, then chief of *Kandahar*, along with his brother *Zulfecur Khan*, they were released by the celebrated *Nadir Shah* in his passage through that country to *Hindoostan*; but as that conqueror still looked upon them with a jealous eye on account of their great influence with their countrymen, both were sent to *Mazandaran* in Persia. Here *Zulfecur Khan*, the brother of *Ahmed*, died; and, some time after, we find the latter promoted to the command of a body of Afghan cavalry in the Persian army. He continued attached to the interests of *Nadir* while that conqueror lived; and even attempted, though ineffectually, to revenge his death. Proving unsuccessful in this attempt, he returned to his own country; and, arriving at *Kandahar*, was saluted chief of the Afghans. In the course of a few months he became master of all the countries which the Mogul had been obliged to cede to *Nadir Shah*; and, encouraged by the distracted state of the affairs of *Hindoostan* at that time, he crossed the *Indus*, and plundered the country to the south-east. An indecisive battle fought with the Indian army under the command of the prince royal and vizier, in which the latter was killed, obliged *Ahmed* to return to his own territories; but he soon undertook another expedition, in which he conquered the province of *Lahore*. In 1755 he returned; and after staying some time at *Lahore*, marched to *Delhi* the capital, having been invited thither, as was supposed, by the Mogul himself, in order to get rid of the tyranny of his vizier. The latter was accordingly deserted in a battle by order of the emperor, and obliged to surrender himself prisoner; but instead of being put to death, he had the address to ingratiate himself with the conqueror; and the unfortunate *Allumghire*, the Mogul, was obliged to submit to be ruled by him as before. *Ahmed* took care to indemnify himself for his trouble, by laying the city of *Delhi* under a heavy contribution: and having staid for about a month, during which time he concluded a marriage betwixt his son *Timur* and the emperor's niece, he marched against a tribe of Hindoos named the *Jauts*, and conquered the greatest part of the province of *Agra*. In this expedition he surprised the city of *Matra*, famous for being the birth-place of *Krishna*, the Apollo of the Hindoos; and sacrificed to the *Gopia*, the muses of the country. He failed in his attempt to surprise *Agra* through the resolution of *Fazil Cawn* the governor; after which he led back his troops to *Delhi*, where he married the daughter of *Mohammed Shah* the late emperor, whom *Allumghire* had in vain solicited for himself.

Having settled his son *Timur* in the government of *Lahore*, *Ahmed* quitted *Hindoostan*, and returned to his dominions, where he found every thing in confusion. *Timur*, who during his father's absence had been frequently disturbed by the *Seiks*, a tribe of Hindoos who profess deism, was in 1760 driven out by a vast army of *Mahrattas* commanded by *Roganaut Row* the *Paishwa's* brother, of whom so much mention is made in history. Next year, however, *Ahmed* crossed the *Indus*, and easily recovered his former territories; soon after which he became head of a league formed among some of the Indian princes, in order to oppose the overgrown power of the *Mahrattas*. In this enterprise he proved successful; and overthrew the *Mahrattas* in a decisive and very bloody battle, in which more than 50,000 of them were killed on the spot. The pursuit lasted several days, and their vast army was totally dispersed; *Ahmed* being every where received with acclamations as the deliverer of the faithful. In 1762 he again crossed the *Indus*, with a view to conquer, or rather to exterminate, the *Seiks*, whose incursions

had become very troublesome, and even dangerous, to his kingdom. Having defeated their army, and forced them to take refuge in the woods and strong holds, he set a price on the heads of all those who professed their tenets; and that with such success, that heaps of them are said to have been piled up in all the principal towns in these parts. At last, hearing that they had assembled in great numbers to celebrate an annual festival, he marched with an army to surprise them. The Seiks, however, were well provided for his reception, and an obstinate battle ensued. During the time of the engagement an eclipse of the sun happened, which, though disregarded by the Seiks, greatly dismayed the superstitious Mohammedans. Ahmed was therefore defeated; and though he frequently returned, was never able thoroughly to subdue that people. At last, having been long afflicted with an ulcer in his face, he died on the 15th of July 1773, at a place named *Kobtoba*, among the mountains of Kandahar, to which he had retired for the sake of coolness, and was succeeded by his son Timur, who still continues to enjoy the sovereignty. The dominions of this prince extend a very considerable way to the northward of the Indus, but he possesses nothing in Hindoostan besides the province of Kashmire.

2. The *Seiks* inhabit a country on the other side of the Indus, and making part of Hindoostan properly so called. They derive their origin from a Hindoo named *Nanuck* of the cast of Khattry. His father, named *Baba Caloo*, possessed a small district in the province of Lahore named *Telvandi*, where *Nanuck* was born in the year 1470. Like other founders of new sects or nations, he is said during his infancy to have given many indications of his future superiority to the rest of mankind. He seems, however, to have received no farther education than what was common to young men of his cast: *viz.* reading, writing, and arithmetic, and hearing the *sastras* or commentaries on the sacred books. In his early youth he was married to a woman of his own cast, by whom he had two sons. Being a convert to the worship of the Invisible, or deism, he accustomed himself to declaim against the folly of worshipping idols, and the impiety of paying adoration to any but the Supreme Being. At the age of 25 he left his family to visit Bengal and the eastern parts of Hindoostan; in a second journey he visited the south, and in a third he went as far as Persia and Arabia. On his return from this last journey, he expressed a desire of remaining in his native country; and was furnished, according to his wish, with a piece of ground on the banks of the river Bavy, about 80 miles north-eastward from the city of Lahore. Here he took up his residence for the rest of his days; and choosing to be free from the cares of this world, he dwelt at a distance from his wife and children, who came occasionally to visit him. Having acquired great reputation for his piety, wisdom, and learning, he died at the age of 70; and since his death the place of his abode has obtained the name of *Dibra Daira*, or "the place of worship." His eldest son founded a sect of devotees named *Nanuck Sboiy*; but his second employed himself in the usual occupations of mankind. On account of the oppression of the Mohammedan governors, however, he removed from *Telvandi*, the estate of his ancestors, and settled at *Kartarpour*, which his descendants still possess. They are respected by the Seiks on account of their being the posterity of *Nanuck*, but are not held in any veneration on a religious account.

The doctrines of *Nanuck* were taught by a favourite disciple of his named *Lbina*, but on whom he bestowed on his death-bed the appellation of *Angud*. By him the doctrines of the sect were collected in a work named *Potky*, or "the book;" and an history of the life of *Nanuck* himself was given in another named *Jenum Sakky*. Both these were written in a particular kind of character called *Gour Mouekty*, and said to have

been invented by *Nanuck* himself. *Angud* named for his successor another disciple called *Amerdofs*; and this method of continuing the succession seems to have been practised as long as the disciples continued to own one supreme chief.

For many years the Seiks lived in peace, and gained the goodwill of the Mohammedan governors by their quiet and inoffensive behaviour. By degrees their numbers and their power greatly increased, but in proportion to their good fortune, they seem to have lost their virtue; so that their gourous, or chiefs, who had hitherto borne the character of apostles, at last stood forth as military leaders. The first of these was named *Tuigh*, whose successor, named *Gowind Sing*, was the tenth and last of the gourous. He engaged in a rebellion against the government; but was at last obliged to submit, and even attended the emperor Bahader Shah in person. At last he was assassinated by a Petan soldier, not without a suspicion of the emperor himself being concerned. As he did not name a successor, his followers chose a chief for themselves named *Banda*, who soon began to make depredations on his neighbours; but being at last taken prisoner, and sent to Delhi with his family and many of his countrymen, they were all put to an ignominious death. By this execution the Seiks were so much exasperated, that they swore eternal vengeance against the Mohammedans, and have ever since manifested a most implacable hatred against them. Taking advantage of the distraction of the Mogul empire by the invasion of Nadir Shah, they conquered several provinces. Wherever they came they threw down the mosques, and obliged every one to quit the country who refused to embrace their tenets. Their war with Ahmed Shah has been already mentioned. Since his death they have recovered all the territories they lost during their contest with him; and now possess the greatest part of Moultan, as well as several districts in the province of Delhi; including in their territories the whole of that rich country named the *Panjab*, on account of five rivers which descend from the northern mountains, and inclose or intersect it, running afterwards into the Indus.

The Seiks, as has already been mentioned, worship one God; but without image, or believing in any mediator. They eat all kinds of meat except beef; sparing the black cattle, in all probability, on account of their utility. Pork is very generally eaten, probably on account of its being forbidden by the Mohammedans. They are commonly dressed in blue, a colour reckoned unlucky by the other Hindoos. Their dress consists of blue trowsers of cotton, a sort of plaid generally chequered with blue and thrown over the right shoulder, with a blue turban. Their government is lodged in an assembly of different chiefs; but who, as individuals, are independent of one another, and have separate territories. They meet annually, or oftener if occasion requires, at a place called *Antberfer*, which is held in a kind of religious veneration; where there is a large tank lined with granite, and surrounded with buildings, and beautifully ornamented. Their force is very considerable, amounting to no fewer than 200,000 cavalry. However, they can seldom be brought to act in concert, unless the whole nation be threatened with some imminent danger. They are a strong hardy race of men, and capable of bearing much fatigue; and so expert in war, that of late almost all the neighbouring countries have been laid under contribution by them, several petty chiefs having consented to pay them a small annual tribute in order to avoid their incursions. When in the field, none but the principal officers have tents, and those extremely small, so that they may be struck and transported with the greater quickness and facility. In cold weather the soldiers wrap themselves during the night in a coarse blanket, which in the time of marching is folded and carried on their horse. Their country is well cultivated, populous, and abounding in cattle, particularly horses, which are reckoned the best in all Hindoostan. This may pro-

bably be owing to the studs which were formerly established in different places of the province of Lahore on account of the Mogul himself. Stallions were sent thither from Persia and Arabia, and there was a fixed order to send to the studs in Lahore all such Arabian and Persian horses as by any accident should be rendered unfit for mounting. Notwithstanding their deism, the Seiks are said to have a superstitious veneration for their sword; inasmuch, that before one of them will eat with a person of another religion, he draws his sword, and passing it over the victuals, repeats some words of prayer, after which he will freely partake of them. Contrary to the practice of all the other Hindoos, they dislike the smoking of tobacco; but many of them smoke and chew bang, which sometimes produces a degree of intoxication.

3. The provinces of *Delhi* have, in the course of a few years, frequently changed their masters, but have scarce at any period during that time been under the authority of the sovereign. Their last governor was named *Nadjiff Khan*, under the title of generalissimo of the emperor. He was involved in the ruin of Mohammed Kouly Khan, cousin to Soujah ul Dowlah; after which he went to Cassim Aly Khan nabob of Bengal; after whose expulsion he retired with a party of horse to Bundelcund into the service of Rajah Coman Sing. He next joined the English; and at last became the general of Shah Allum. With a body of English sepoy who had been put under his command, and some other troops whom he had taken into his service, he subdued the countries near Delhi, conquered almost all the territories of the Jauts, reducing the cities of Agra, Dieg, and other principal towns. These conquests were indeed effected in the name of the Mogul, but he derived little benefit from them; Nadjiff being the real master, and keeping possession of them till his death, which happened in 1782: and since that time the countries we speak of have been involved in a scene of continual anarchy and bloodshed.

4. Next to the provinces of *Delhi* are the dominions of the independent *rajahs*, whose dominions lie contiguous to one another. The principal are those of Joinagar or Jaypour, Joadpour or Marwar, Oudiapour or Chitore, and Jesalmire. These countries are under a kind of feudal constitution, and every village is obliged to furnish a certain number of horsemen at the shortest warning. The people are brave, hardy, and very much attached to their respective chiefs; and their army is very formidable, amounting when collected to about 150,000 horsemen.

5. The *Jauts* were a tribe who followed the occupation of agriculture in the northern parts of Hindoostan. About 40 years ago they were formed into a nation by Tackou Souragemul, proprietor of an inconsiderable district. After making himself master of all the countries dependent on Agra, of the town itself, and many other important places, he was killed in battle with Nadjib ul Dowlah, the Rohilla chief, in 1763. Since that time the power of this people has been so much reduced by domestic contentions and foreign wars, that the present rajah possesses only a strong town named *Bartpour*, with a small district around it. The Jauts, however, it is said, are now manifesting a martial disposition, and thus may possibly be soon in a condition to recover their former extent of territory.

6. The most considerable of all the Hindoo powers are the *Mahrattas*, with whom the Europeans first became acquainted in their original territories of Malabar. The first of their chiefs was named *Seeva*, or *Seeva-jee*; who is said to have been descended from the ancient Hindoo emperors, and whose father was lord of a small district, for which he paid tribute to the Mohammedan king of Viziapour. For some reason, unknown to us, he was at last arrested by order of that king, and died in confinement; but his son Seeva-jee took up arms in defence

of his country, and made himself master of several important places, with a considerable tract of territory, which were afterwards ceded to him by the queen-regent, the king of Viziapour having died soon after the commencement of the war.

Seeva-jee having thus established himself, soon became formidable to his neighbours. Many of the Hindoo princes put themselves under his protection, and he at length ventured to make war upon the emperor Aurengzebe. In this he proved unsuccessful, was taken prisoner, and carried to Delhi. Having found means, however, to make his escape, he quickly recommenced hostilities; and the emperor, who was now far advanced in life, thought proper to come to an accommodation with so troublesome an enemy. On this occasion the Mahrattas pretend that their prince obtained a grant of 10 per cent. on all the revenues of the Deccan; which has often served as a pretence to invade that country, and levy contributions on the southern nabobs. Since that time the Mahrattas have become so powerful, that all the princes of Hindoostan are alarmed when they put themselves in motion. Their territories extend about 1000 miles in length and 700 in breadth; and they are governed by a number of separate chiefs, all of whom acknowledge the Ram Rajah as their sovereign, and all except Moodajee Booslah acknowledge the Paishwa as his viceroy. The capital of the sovereign was Sattarah; but the Paishwa generally resides at Poonah, one degree to the southward, and about 100 miles distant from Bombay. The country extends along the coast nearly from Goa to Cambay. On the south it borders on the territories of Tippoo Saib; on the east it has those of the Nizam and the rajah of Berar; and on the north those of the Mahratta chiefs Sindia and Holkar.

7. The *rajah of Berar*, besides that country, has the greatest part of Orissa. His dominions extend about 600 miles in length from east to west, and 250 from north to south. The eastern part of the Orissa extends along the sea-coast for about 150 English miles, and divides the British possessions in Bengal from those commonly called the *Northern Circars*. On the west his territories border upon those of the Paishwa; on the south, upon those of the Nizam, Mahomet Hyat a Patan chief, Nizam Shah, and Ajid Sing. The rajah himself resides at Nagarpour, about midway betwixt Calcutta and Bombay.

8. *Madajee Sindia* has the greatest part of the government of Malva, together with the province of Cardeish. The remainder is under the government of Holkar; who, as well as Sindia, pretends to be descended from the ancient kings of Malva. The principal residence of Sindia is at Ugein near the city of Mundu, which was once the capital of these kings. Holkar resides at Indoor, a town little more than 30 miles to the westward of the former. The dominions of these, and some other princes of smaller note, extend as far as the river Jumna.

The two last-mentioned princes, though properly Mahrattas, owe no allegiance to the Ram Rajah or great chief to whom the main body are nominally subject. Some time ago the Mahrattas aimed at the conquest of all Hindoostan, and even avowed a design of expelling all the Mohammedan princes; but their power was effectually checked by the British, and their dissensions among themselves put an end to all schemes of that kind. Still, however, they were ready to watch every opportunity of invading the territories of their neighbours; and their resources being so considerable, they were deservedly accounted a very formidable enemy. The strength of their army consists chiefly in cavalry; and both men and horse are capable of enduring a great deal of fatigue. Bodies of 50 or 60,000 cavalry have been known to travel 50 miles a day for many days together; which, considering the excessive heat of the country, must certainly appear very surprising. The country abounds very much in horses, and there is one kind named the *Breemerteddy* horse, which is greatly esteemed, and sold at a very high price. The

common horse of these parts is lean and looks ill, but is abundantly fit for the purposes of war. The only weapon used by the horsemen is a sabre; in the use of which they are so dexterous, that it is supposed the best European hussar would not be more than a match for a Mahratta horseman. There are considerable studs in every province belonging to the Paishwa and different chiefs; and there are likewise many *jundis* or great herds of horses belonging to particular persons, who turn those they have no occasion for loose in the open plains.

The Mahratta horsemen are dressed in a quilted jacket of cotton, which is supposed to be one of the best defences against a sword that can easily be contrived of equal lightness; but the heat of the climate frequently renders it necessary to be taken off. The rest of their dress consists of a pair of trousers, and a kind of broad turban which descends low enough to cover the neck and shoulders. In cases of emergency the horsemen carry provisions both for themselves and their horses in a small bag tied upon the saddles: the food of the rider consists only of a few small cakes with a little flour or rice, and some salt and spices; the horse is fed with a kind of peas named *gram*, or with balls made of the flour of these peas mixed with butter, prepared after a certain manner, and named *ghce*, together with some garlic and hot spices. These balls are given by way of cordial, and have the property of invigorating the animal after extraordinary fatigue. Sometimes it is said that they add a small quantity of *bang*; a kind of drug which possesses an exhilarating virtue, and produces some degree of intoxication. The Mahratta cavalry seldom make any use of tents: even the officers frequently have no other accommodation than a small carpet to sit and lie on; and a single camel is able to carry the whole baggage of the general. The officers, however, are generally well mounted, and have spare horses in the field.

All the subjects and vassals of the Mahratta princes are generally ready to follow them into the field; and in any case in which the honour or interest of the nation appears to be concerned, they generally unite in the common cause. Before they invade any country, the general is at great pains to inform himself of the nature and situation of it; and they have now made incursions into so many different parts of Hindoostan, that there are but few countries there with which they are not very well acquainted. Their great sobriety, and the fatigue they are capable of undergoing, render them very dangerous enemies. In all their expeditions the soldier first provides for his horse, and then goes to his own meal; after which he lies down contented by the side of the animal, and is ready to mount him at the first sound of the *nagar* or great drum. They have their horses under the most excellent management; and by perpetually caressing and conversing with them, the animals acquire a degree of docility and sagacity unknown in other countries. When on an expedition, the horses are accustomed to eat grass pulled up by the roots, which is said to be very nutritive, and to be destitute of that purgative quality which belongs to the blade alone. When they make an invasion, the devastation is terrible; the cattle are driven off, the harvest destroyed, the villages burned, and every human creature destroyed who comes in their way. Notwithstanding this barbarity in time of war, however, they are very humane in time of peace, living in great harmony among themselves, and being always ready to entertain and assist strangers. Many of the cruelties they commit may be justly reckoned the effects of retaliation for other cruelties exercised upon them by their adversaries. Thus in 1771, after having given Hyder Ally a great defeat, they cut off the ears and noses of a whole regiment of prisoners, and in that condition sent them back to their commander, in return for his having done the same to a few prisoners he had taken some time before.

The revenue of the Paishwa is very considerable; being not less than ten millions sterling; but after deducting the expence of collection, and the expence of troops kept in readiness for the service of the state, it is supposed that he cannot receive more than four millions. From this again we must deduct the expences of the troops immediately belonging to the Paishwa himself, and which may amount to about three millions sterling; so that there remains a surplus only of one million after paying all the necessary expences of government. This nevertheless has been managed with such economy, that though long and expensive wars were carried on after the death of Narrain Row, the state was not only clear of debt, but there was a surplus of two millions in the treasury, which Rogobah dissipated.

9. The *Deccan*, as left in 1748 by Nizam al Mulek, was by far the most important and extensive foubadary or viceroyship in the empire. It then surpassed in size the largest kingdom in Europe; but since that time many provinces have been conquered by the Mahrattas, and the northern Circars, by the British. The possessions of the Nizam are also diminished by the cession of the Carnatic to the nabob of Arcot; great part of the territories of Tippoo Saib; and many other provinces of less note. Still, however, the Nizam possesses very considerable territories; but his finances are in such a wretched condition, and his provinces so ill governed, that he is accounted a prince of no consequence, though otherwise he might be reckoned one of the most considerable powers of Hindoostan.

10. The *dominions of Tippoo Saib*, the son and successor of Hyder Ally, are bounded on the north by the territories of the Paishwa: on the south by Travancore, the territory of an independent Hindoo prince; on the west by the sea; and on the east by a great ridge of mountains, which separate them from the territories of the nabob of Arcot. The country lying to the eastward of these mountains is called the Carnatic *Payen Ghat*, and to the westward the Carnatic *Bhalla Ghat*. The latter belongs to Tippoo Saib; and the two together make up the country formerly called the *Carnatic*, though the name is now restricted to the *Payen Ghat*. The situation of the Bhalla Ghat is considerably more elevated than the other; by which means the temperature of the air is much cooler. On the coast of Coromandel there is a pile of ruins called by the natives *Malavi-patam*, and by the British *the seven pagodas*. Concerning this there is a tradition, that it once stood at a considerable distance from the sea; though most of the ruins are now covered with water: and there is likewise a tradition, that the mountains we speak of once formed the boundary of the ocean. The revenue and strength of Hyder Ally are said to have been greatly exaggerated; the former amounting to no more than four millions annually, though by his economy and good management he made it answer every purpose both in time of war and peace. He was at great pains to introduce the European discipline among his troops; but notwithstanding all his endeavours, he was far from being able to make them cope with the British. The advantages he gained were owing to his vast superiority in cavalry, and the celerity of his marches; which would have been counteracted had his adversaries been possessed of a good body of cavalry; and it is probable that the event of the war would have been decided in a single campaign. His son Tippoo Saib is said to be a man of less abilities than his father, though more violent in his disposition. Against this prince hostilities were some time ago commenced by the British in conjunction with the Mahrattas, between whom an alliance had been formed. The peace since concluded has been attended with consequences highly advantageous to England.

With regard to the present government of Hindoostan, our limits will not allow us to enter particularly upon it, nor indeed is it perhaps of any importance, as the country is divided into so many different kingdoms; the sovereigns of which,

however they may differ in other respects, seem all to agree in despotism and oppression of their subjects.

The British territories in the East Indies were originally under the jurisdiction of a governor and 13 members; but this number has fluctuated occasionally from 14 to 4, at which it was fixed by act of parliament. In this council, all matters, whether relating to peace or war, government or commerce, were debated, the governor having no other superiority than that of giving the casting vote. In other respects the whole executive power was lodged in his hands, and all the correspondence with the native princes of India was carried on by his means, the dispatches to them being signed by him singly; and all the princes and great men who visited the presidency were first received by him, and then introduced to the counsellors. He was military governor of Fort William, and commander in chief of the presidency; whence, as by his office he was invested with a considerable degree of power, he became an object of some envy and jealousy to the members of the council and other considerable people in that part of the world. This circumstance occasioned the government to be divided into two parties, one siding with the governor, and the other opposing him; in consequence of which, the debates were frequently carried on with an indecent degree of heat and violence. This indeed may be looked upon as one of the principal causes by which the reputation of the British government in the eastern parts of the world has suffered; for, as there were very frequently opinions diametrically opposite to one another recorded upon the same subject, the contending parties in the British parliament had always sufficient authority for what they said, let them take which side they would; and thus the characters of all concerned in the East India government were, with great appearance of justice, set forth in the most opprobrious light. Another source of just reproach was, that the court of directors in England became infected with the same spirit of party which pervaded all other departments of the state; and hence arose innumerable disputes and contentions highly disgraceful to those concerned.

With regard to the administration of British affairs in the East Indies, it must indeed be remarked, that the company now act in a very different capacity from what they originally did. From a society of merchants, they are now become sovereigns of the country to which they trade. The latter character was quite foreign to them; and they have accordingly looked upon that of merchants as the principal one, while that of sovereigns was to be only a kind of appendage to it. Thus, instead of acting for the interest of the country they govern, and which as sovereigns they naturally ought to do, they have acted in many cases directly opposite to it, which, as merchants, is also their natural interest. Hence also, when the administration in India did any thing in obedience to the orders of the directors, which orders being dictated by merchants were prejudicial to the interests of the country, that injury has been sometimes unjustly attributed to their servants, who acted merely in obedience to the orders they received. On the other hand, when the India administration acted with the generous spirit of sovereigns, they were sometimes blamed by the directors, who judged as merchants, and sometimes by the ministry, who were always ready, upon the smallest pretence, to interfere in their affairs.

At the time when the British administration first commenced in Hindoostan, the Hindoo governors were universally named *Rajabs*; but though many of the Hindoo families yet bear that title, it does not appear to resemble, in any manner of way, our titles of nobility, or to be a dignity which can be conferred by any of the princes, or even by the Mogul himself. Hence, in that part of the world there are no ancient nobility, the titles being conferred merely by usurpers, who have neither right nor title derived from any thing but violence.

In this country we find the title of *Zemindar* very common;
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a word compounded of two others, signifying, in the Persian language, a *landholder*. It appears to have been introduced by the Mohammedans, and to have been a kind of temporary office, prescribing the performance of certain duties, and requiring security for the personal appearance of the *Zemindar*. He is obliged to attend the exchequer of the king's chief collector, at the commencement of every new year, to settle his revenues; and he is not allowed to enter upon the duties of his office for the year without a special order for that purpose. On the death of a *Zemindar*, the candidate for succession must petition the sovereign, engaging himself to perform all the stipulated duties and to pay the customary fees; nor can he enter upon his office without a special investiture. As the *Zemindars* were by virtue of their office invested with considerable power, they soon became not only very despotic in their own dominions, but by degrees began to encroach on the power of the sovereign himself. After the irruption of Nadir Shah every thing was thrown into confusion; the viceroys threw off obedience to the emperor, the nabobs threw off all obedience to them, and usurped their power; at which time it is probable that the *Zemindars* likewise assumed powers to which they were by no means entitled from their office. Notwithstanding this, however, they were sometimes treated by the Mohammedan governors as mere revenue-officers, and used very harshly. At some times there were a set of people bound to the *Zemindars* under the title of *Woodedars*; and these had either a joint power with the former, or were superior to them in the collection of the revenues; and sometimes they were superseded by officers appointed immediately by government itself, under the various names of *Aumils*, *Tabfinders*, or *Sezawuruls*. The *Zemindaries* are not limited in extent or value; there being some in Bengal which yield a revenue as high as 350,000l. sterling, while others scarcely amount to 350l.; but all the great *Zemindars*, and many of those in middling circumstances, having procured for themselves the title of *Rajab*, affect much pomp and state in their different districts, and keep their inferiors in as great subjection as the Mohammedan governors keep them. Some of them also have their power augmented by being of the bramin cast. By the reverence supposed to be due to religion on that account, joined with the power conferred upon them by the sovereign, they are in general rendered exceedingly despotic, with an almost unlimited authority to plunder their tenants; in which they were indulged by the nabobs from the motive of plundering them again. From the consultations of the select committee in 1769, we are informed that the *Zemindars* have a power of levying fines at pleasure; that they raise large sums from duties collected in the market; and that they frequently oblige the ryots or husbandmen to work for nothing. In short, the same claims made by the European barons on their vassals in the times of the feudal system, are now made by the *Zemindars* on the common people of Hindoostan. If one of them is to be married, if he has a child born, if honours are to be conferred upon him; nay, if he is even to be fined for his own misconduct, the poor ryot must always contribute his share. Mr. Scrafton, in his history of Hindoostan, sets forth the situation of the inhabitants in the following words:—"Unhappily for the Gentoos, themselves are made the ministers of oppression over each other: the Moor men, haughty, lazy, and voluptuous, make them, of whom they have no jealousy, the ministers of their oppression, which further answers the end of dividing them, and prevents their uniting to sling off the yoke; and by the strange intoxication of power, they are found still more rapacious and cruel than their foreign masters: and what is more extraordinary, the bramins still exceed the rest in every abuse of power, and seem to think, if they bribe God by bestowing a part of their plunder on cows and saquirs, their iniquities will be pardoned."

From this account of the situation of the people of Hindoostan

under their native rulers, it is by no means probable that they could make a worse exchange by falling under the jurisdiction either of the Mohammedans or Europeans. A notion indeed hath been indutritiously propagated, that the British government has behaved with the greatest cruelty in collecting the revenues, and that they have even invented tortures to make the rich people discover their treasures; but on examining the matter impartially, the reverse of this is found to be true. At the time that the British government interfered in the affairs of Hindoostan, the provinces were found to be in a ruinous state, in consequence of the wars which had taken place in the country. Even in the most settled state, and when the administration was most regular, the government was altogether despotic, and the mode of collecting its revenues extremely arbitrary; the punishments inflicted very cruel; and the whole system of government such as would be reckoned quite shocking in Europe. It is only within these few years that the British could effectually interpose in behalf of the natives; and in that short time it has produced a very considerable reformation. It is certain, that the British government has discouraged oppressive measures as much as possible; abolished the cruel modes of punishment used by the Mohammedans; and by instituting a more regular plan of justice, has procured ease and security to the natives, and preserved them in a state of tranquillity altogether unknown to them before its commencement.

One great objection, however, to the India government is, that the English law, which undoubtedly is better calculated than any other for securing the liberties of the people, has not yet been adopted in India; whence it is thought that the company's servants have still showed a disposition to oppress, rather than to relieve, the oppressed inhabitants of Hindoostan. But in answer to this it is said, that the difference betwixt the two countries is so great, that there can be no comparison betwixt the one and the other, nor can the constitution of England be in any degree adapted to that of the other. The religion, laws, manners, and customs, of both Hindoos and Mohammedans, are so essentially different from those of this country, that it is impossible to assimilate them, should ever any thing of the kind be attempted. The only true method therefore of judging whether the present state of Hindoostan is preferable to what it formerly was, is to compare it with what it was under the best Mogul emperors; and in this comparison it must certainly appear that the preference is greatly in favour of the British administration. In Major Rennel's work we are informed, that during the reign of Ackbar, whom he styles "the glory of the house of Timur," the country had never enjoyed so much tranquillity; "but this tranquillity would hardly be deemed such in any other quarter of the world, and must therefore be understood to mean a state short of actual rebellion, or at least commotion." The same author, speaking of the state of the British empire there, uses the following words: "The Bengal provinces, which have been in our actual possession near 23 years, have, during that whole period, enjoyed a greater share of tranquillity than any other part of India, or indeed than those provinces had ever experienced since the days of Aurengzebe." To this we may add, that the provinces have not only experienced a perfect freedom from external invasions, but likewise enjoy a degree of internal tranquillity altogether unknown before, by the subjection and civilization of a set of banditti who inhabited the hills of Rajemahl, and infested the travellers who passed that way; a wandering tribe of religious mendicants, who were wont to commit the greatest enormities.

Another advantage the inhabitants of this country reap from the British government, is the security from violence and oppression either by their Mohammedan superiors or by one another. Under the article HINDOO we have already mentioned the particular circumstance that these people are liable to the

punishment of losing their cast from a variety of causes, and that this is looked upon by them to be the most grievous calamity they can suffer. The Mohammedan governors frequently took advantage of their superstition in this respect to oppress them; and this circumstance alone frequently produced the most horrid confusion. In the instructions given to the supervisors, Mr. Verelst informs them, that "it is difficult to determine whether the original customs, or the degenerate manners of the Mussulmen, have most contributed to confound the principles of right and wrong in these provinces. Certain it is (adds he), that almost every decision of theirs is a corrupt bargain with the highest bidder. Compensation was frequently accepted of even for capital crimes, and fines became at last an intolerable grievance; nay, so venal were the judges at that time, that it became at last a settled rule to allow each of them a fourth part of any property in dispute as a compensation for his trouble. It is impossible to suppose that such monstrous abuses continue under the British government: on the contrary, we must readily believe, what the governors themselves assert, that immediately after the provinces fell under British jurisdiction, both Hindoos and Mohammedans have been left to the free exercise of their religion, laws, and customs. The Hindoos themselves acknowledge this, and are as well pleased with the mildness of the British government, as they are displeased with the superstition and cruelty of the Mohammedans. Under the British government we cannot suppose but that commerce, to which the inhabitants of this country are so much addicted, will be much more encouraged than by the avaricious and barbarous Mohammedans. The latter had imposed so many restraints upon trade of all kinds, by the multitude of taxes collected at the landing-places, watch-houses, markets, &c. that it was almost impossible to carry it on with any advantage. Among other salutary regulations, however, enacted by the British government in 1772, many of those taxes upon commerce were abolished, and a plan laid for effectually liberating the inhabitants from those shackles by which their commerce had been so long fettered. Regard has also been paid to the instruction of the people in useful knowledge; and the seminary established at Calcutta by Sir William Jones, certainly does much honour to the founder. Some regard had indeed been paid to this by the Mohammedan emperors; but at the time that the British government commenced, these had been entirely neglected, their endowments resumed by government, and even the buildings fallen into ruin.

From a comparison of any government to which the Hindoos have hitherto been subject, with that of Britain, indeed, it is evident that the preference must be given greatly in favour of the latter. At the time when the British first visited that country, they were not under the jurisdiction of their native sovereigns, nor had they been so for a long time before. The Moguls were not only foreigners, but a most cruel and detestable race of men; and it was by usurpations of their own rebellious subjects that the anarchy and confusion was introduced, in which the country was involved for so long a time. The British are foreigners as well as the Moguls; but the latter, who profess the intolerant superstition of Mohammed, suffer their conduct to be influenced by it in such a manner as to treat the natives with the utmost cruelty. The greatest evil perhaps which results from the British government is, the exportation of great sums of money to a foreign country; but this evil, with respect to the provinces possessed by the British, existed also under the Mohammedan government. The Mogul emperors resided at Delhi, which is far distant from the provinces of Bengal, Bahar, and Orissa, the territories now possessed by Britain; so that the greatest part of the treasure sent to that capital was totally lost to them. In the time of Aurengzebe, the emperor's tribute amounted to three millions sterling; and of this a considerable part was specie; but since that time the tribute was fixed at

only 1,250,000*l.* and even this was a vast sum ; to which if we add that carried out of the country by commanders of mercenary troops who were all foreigners, it is not unreasonable to suppose that under the Mogul government matters were still worse, even in this respect, than under that of Britain.

With regard to the *geography* of this country, Mr. Rennel observes, that though, by the modern Europeans, Hindoostan has been understood to mean the tract situated between the rivers Indus and Ganges on the east and west, the mountains of Thibet and Tartary on the north, and the ocean on the south, the extent of Hindoostan, properly so called, is much more circumscribed ; and the name ought only to be applied to that part which lies to the northward of 21° or 22° latitude. The reputed southern boundary of Hindoostan is the Nerbudda river as far as it goes, and the northern frontiers of Bengal and Bahar compose the remainder. The countries to the south of this line are called *Deccan* by the Indian geographers, and comprehend about one half of the territory generally known by the name of the *Mogul Empire*. Our author therefore chooses to distinguish the northern part by the name of *Hindoostan Proper* ; which has indeed the Indus and mountains of Thibet and Tartary for its western and northern boundaries ; but the Burrampooter river is rather to be considered as the eastern boundary than the Ganges ; the latter intersecting some of the richest provinces in the empire. According to this supposition, Hindoostan Proper will equal in size the countries of France, Germany, Bohemia, Hungary, Switzerland, Italy, and the Low Countries ; the Deccan and peninsula being about equal to the British islands, Spain, and Turkey in Europe.

Towards the north, Hindoostan is very cold and barren ; but towards the south, very hot, and fertile in corn, rice, fruits, and other vegetables. The northern provinces are very mountainous and sandy ; while the southern are for the most part level, and well watered with several rivers.

The most remarkable *mountains* are those which surround it on three sides. Those on the west, separating it from Persia, called, in general, *Solymán Kay*, or *the mountains of Soleyman*, are of a vast height as well as breadth, and are only passable in certain places, through which roads have been made for the sake of commerce. The chief are those which lead to Kabul, Gazna, and Kandahar. This great chain of mountains is inhabited by different nations, the principal of which are the Afghans, or Patans, and the Baluches, who have extended themselves on the side of India, as well as Persia. The mountains on the north are called *Nagarakut*, *Hima*, or *Más Táq*, which has an affinity with *Imaüs*, and by other names, which are given also in common to the mountains on each side, separating Hindoostan from Thibet. The very prospect of these mountains is frightful, being nothing but hideous precipices, perpetually covered with snow, and not to be crossed without the greatest danger and difficulty.

The most remarkable *rivers* of Hindoostan are the Indus and Ganges. The former is called by the orientals, *Send*, *Sind*, or *Sindi*. It rises in the mountains to the north or north-east of Hindoostan ; whence, after a long course, first to the south and then to the south-west, it falls into the Persian sea, below Lower Bander, by several mouths. In its course it receives several other large rivers, as the Niláh, Jamal, Behat, and Lakka. The *Ganges*, called in the Indies *Ganga*, rises in the kingdom of Thibet ; entering Hindoostan about the 30th degree of latitude, it runs first south-eastward by the cities of Bikaner, Minapor, Halabas, Banáres, and Patna, to Rajah Mahl, where it divides into two branches. The eastern having passed by Dákka, the capital of Bengal, enters the gulph of that name about Chatigan. The western, descending by Kossim-Bazar and Hughly, falls into the gulph below Shanderbagor, towards Pipeli. Many of the Jews and ancient Christians believed this river to be the

Pison, one of the four mentioned in scripture as the boundaries of the terrestrial paradise. The Indians retain the greatest reverence for its waters, going in crowds from the remotest parts of the country to wash in them, from a persuasion that they wholly obliterate the spots of sin. The reason of this is, because they imagine this river does not take its source from the bosom of the earth, but descends from heaven into the paradise of Devendre, and from thence into Hindoostan. Nothing is more childish than the fables of the Bramins on this subject, yet the people swallow them all. The Mogul and prince of Golconda drink no other water than that of the Ganges : foreigners, on the contrary, allege that it is very unwholesome, and that it cannot be safely drunk till it is first boiled. There are a great number of superb pagodas on the banks of the Ganges, which are immensely rich. At certain festivals, there has been sometimes a concourse of 100,000 people who came to bathe in it. But what principally distinguishes this river, besides its greatness and rapidity, is the gold it brings down in its sands, and throws on its banks ; and the precious stones and pearls it produces, not only in itself, but in the gulph of Bengal, into which it discharges its waters, and which abound therewith. The Chun or Jemma, the Guderassu, the Persilis, Lakia, and several other rivers, discharge themselves into it during its course.

The *weather* and *seasons* are, for the most part, very regular in this spacious country : the winds blowing constantly for six months from the south, and six from the north, with very little variation. The months of April, May, and the beginning of June, till the rains fall, are so extremely hot, that the reflexion from the ground is apt to blister the face ; and but for the breeze or small gale of wind which blows every day, there would be no living in that country for people bred in northern climates ; for, excepting in the rainy season, the coldest day is hotter there at noon than the hottest day in England. However, very surprising changes of heat and cold sometimes happen within a few hours ; so that a stifling hot day is succeeded by a night cold enough to produce a thin ice on the water, and that night by a noon as scorching as the preceding. Sometimes, in the dry season, before the rains, the winds blow with such extreme violence, that they carry vast quantities of dust and sand into the air, which appear black, like clouds charged with rain ; but fall down in dry showers, filling the eyes, ears, and nostrils of those among whom they descend, and entering every chest, cabinet, or cupboard, in the houses or tents, by the key-hole or crevices.

From Surat to Agra, and beyond, it seldom or never rains, excepting in one season of the year ; that is, from the middle of June to the middle of September. These rains generally begin and end with most furious storms of thunder and lightning. During these three months it rains usually every day, and sometimes for a week together without intermission : by this means the land is enriched, like Egypt by the Nile. Although the land look before like the barren sands of the Arabian deserts ; yet, in a few days after those showers begin to fall, the surface appears covered with verdure. When the rainy season is over, the sky becomes perfectly serene again, and scarce one cloud appears all the other nine months : however, a refreshing dew falls every night during that dry interval, which cools the air, and cherishes the earth.

The *produce* of Hindoostan is very rich in every kind, whether it be fossil, vegetable, or animal. Besides other precious stones found in it, there is a diamond-mine at the town of Soumelpûr in Beugal. Quarries of Thibetan stone are so plentiful in the Mogul's empire, that there are both mosques and pagods built entirely of it. Some travellers tell us, there are mines of lead, iron, and copper, and even silver ; but those of the last if there be any, need not be opened, since the bullion of all na-

tions is sunk in this empire, which will take nothing else in exchange for her commodities, and prohibits the exporting it again. They till the ground with oxen and foot-ploughs, sowing in May and the beginning of June, that all may be over before the rains, and reaping in November and December, which with them are the most temperate months in the year. The land is no where inclosed, excepting a little near towns and villages. The grass is never mowed to make hay, but cut off the ground, either green or withered, as they have occasion to use it. Wheat, rice, barley, and other grain, grow here in plenty, and are very good. The country abounds no less in fruits, as pomegranates, citrons, dates, grapes, almonds, and cocoa-nuts; plums, those especially called *mirabolans*; plantains, which in shape resemble a slender cucumber, and in taste exceed a Norwich pear; mangos, an excellent fruit, resembling an apricot, but larger; ananas, or pine-apples; lemons and oranges, but not so good as in other countries; variety of pears and apples in the northern parts; and the tamarind-tree, the fruit of which is contained in a pod resembling those of beans. There are many other kinds of fruit-trees peculiar to the country. But the valuable trees are the cotton and mulberry, on account of the wealth they bring the natives from the manufacture of calicoes and silks. They plant abundance of sugar-canes here, as well as tobacco; but the latter is not so rich and strong as that of America, for want of knowing how to cure and order it.

Hindoostan affords also plenty of ginger, together with carrots, potatoes, onions, garlic, and other roots known to us, besides small roots and herbs for sallads; but their flowers, though beautiful to look at, have no scent, excepting roses, and some few other kinds.

There are great variety of *animals* in this country, both wild and tame; of the former are elephants, rhinoceroses, lions, tigers, leopards, wolves, jackals, and the like. The jackals dig up and eat dead bodies, and make a hideous noise in the night. The rhinoceros is not common in the Mogul's empire; but elephants are very numerous, some 12, 14, or 15 feet high. There is plenty of venison, and game of several kinds; as red deer, fallow-deer, elks, antelopes, kids, hares, and such like. None of these are imparked, but all in common, and may be any body's who will be at the pains to take them. Among the wild animals also may be reckoned the musk-animal, apes, and monkeys.

Hindoostan affords variety of beasts for carriage, as camels, dromedaries, mules, asses, horses, oxen, and buffaloes. Most of the horses are white, and many curiously dappled, pied, and spotted all over. The flesh of the oxen is very sweet and tender. Being very tame, many use them as they do horses to ride on. Instead of a bit, they put one or two small strings through the gristle of the nostrils, and fastening the ends to a rope, use it instead of a bridle, which is held up by a bunch of gristly flesh which he has on the fore-part of his back. They saddle him as they do a horse; and, if spurred a little, he will go as fast. These are generally made use of all over the Indies; and with them only are drawn waggons, coaches, and chariots. Some of these oxen will travel 15 leagues in a day. They are of two sorts; one six feet high, which are rare; another called *dwarfs*, which are only three. In some places, where the roads are stony, they shoe their oxen when they are to travel far. The buffalo's skin makes excellent buff, and the female yields very good milk; but their flesh is neither so palatable nor wholesome as beef. The sheep of Hindoostan have large heavy tails, and their flesh is very good, but their wool coarse.

This country is much infested with *reptiles* and *insects*; some of a noxious kind, as scorpions, snakes, and rats; but the lizards, which are of a green colour, are not hurtful. Snakes

and serpents, we are told, are sometimes employed to dispatch criminals, especially such as have been guilty of very atrocious crimes, that kind of death being attended with the most grievous torture. The most troublesome insects in this hot country are flies, musketoes, and chinchies or bugs, the first by day, and the others in the night; when they offend no less by their stench than their bite.

HINE, or HIND, a husbandman's servant. Thus the person who oversees the rest, is called the master's hine.

HINGHAM, a town of Norfolk, with a market on Saturday. It is 12 miles S. W. of Norwich, and 97 N. E. of London. E. lon. 1. 4. N. lat. 52. 43.

HINNOM, or *the Valley of HINNOM*, in ancient geography, a place that lay to the south of Jerusalem. It was also called *the Valley of Tophet*, and was remarkable for the cruel and barbarous worship of the god Moloch, where parents made their children pass through the fire in honour of that idol.

HINZUAN, or JOANNA, one of the Comora Islands, between the north end of Madagascar and the continent of Africa. It has been governed, about two centuries, by a colony of Arabs, and exhibits a curious instance of the slow approaches towards civilization, which are made by a small community, with many natural advantages. Of this African island, in which we hear the language and see the manners of Arabia, an account has been written by sir William Jones, for the Society for the Promotion of Oriental Knowledge, of which he was president. He visited this island, on board the Crocodile frigate, in July 1783. On anchoring in the bay, the frigate was soon surrounded by canoes, and the deck crowded with natives of all ranks, from the high-born chief who washed linen, to the half-naked slave who only paddled. Most of them had letters of recommendation from Englishmen, which none of them were able to read, though they spoke English intelligibly; and some appeared vain of titles which our countrymen had given them in play, according to their supposed stations. "We had," says Sir William Jones, "lords, dukes, and princes, on board, soliciting our custom, and importuning us for presents. In fact, they are too sensible to be proud of empty sounds, but justly imagined that those ridiculous titles would serve as marks of distinction, and, by attracting notice, procure for them something substantial." The appearance of the island from the bay of Hinzuan is thus described by the same writer: "We were at anchor in a bay, and before us was a vast amphitheatre, of which you may form a general notion by picturing in your minds a multitude of hills, infinitely varied in size and figure, and then supposing them to be thrown together, with a kind of artless symmetry, in all imaginable positions. The back ground was a series of mountains, one of which is pointed, near half a mile perpendicularly high from the level of the sea, and little more than three miles from the shore; all of them richly clothed with wood, chiefly fruit-trees, of an exquisite verdure. I had seen many mountains of a stupendous height in Wales and Switzerland, but never saw one before, round the bosom of which the clouds were almost continually rolling, while its green summit rose flourishing above them, and received from them an additional brightness. Next to this distant range of hills was another tier, part of which appeared charmingly verdant, and part rather barren; but the contrast of colours changed even this nakedness into a beauty: nearer still were innumerable mountains, or rather cliffs, which brought down their verdure and fertility quite to the beach; so that every shade of green, the sweetest of colours, was displayed at one view, by land and by water. But nothing conducted more to the variety of this enchanting prospect than the many rows of palm-trees, especially the tall and graceful Arcas, on the shores, in the

REMARKS

- Territories ceded to the British by Tippoo Sultan, according to the Fourth Treaty made at Seringapatam in the Year 1792.
- 1 D^o to the Nizam
 - 2 D^o to the Peshwa
 - 3 D^o to the Peshwa



valleys, and on the ridges of hills, where one might almost suppose them to have been planted regularly by design. A more beautiful appearance can scarce be conceived, than such a number of elegant palms in such a situation, with luxuriant tops, like verdant plumes, placed at just intervals, and showing between them part of the remoter landscape, while they left the rest to be supplied by the beholder's imagination. Neither the territory of Nice, with its olives, date trees, and cypresses, nor the isles of Hieres, with their delightful orange-groves, appeared so charming to me as the view from the road of Hinzuani." This island has likewise been described by major Rooke, who observes, that it is a proper place of refreshment for the India ships, whose crews, when ill of the scurvy, soon recover by the use of limes, lemons, and oranges, and from the air of the land. The town where the king resides is at the E. side of the island; and though it is three quarters of a mile in length, it does not contain above 200 houses. This town is close to the sea, at the foot of a very high hill. The houses are inclosed either by high stone walls or pailings made with a kind of reed; and the streets are little narrow alleys, extremely intricate, and forming a perfect labyrinth. The better kind of houses are built of stone, within a court-yard, have a portico to shield them from the sun, and one long lofty room where they receive guests; the other apartments being sacred to the women. The sides of their rooms are covered with a number of small mirrors, bits of China ware, and other little ornaments that they procure from the ships: the most superb of them are furnished with cane sofas, covered with chintz and satin matrasles. The horned cattle are a kind of buffaloes, having a large hump on their shoulders, which is very delicious eating; but there is not one horse, mule, or ass, in all the island. The original natives, in number about 7000, occupy the hills, and are generally at war with the Arabian interlopers, who established themselves on the sea-coast by conquest, and are about 3000 in number. Though Joanna is not the largest, it may be reckoned the principal of the Comora islands. It claims sovereignty over, and exacts tribute from, all the others: these pretensions it is, however, sometimes obliged to assert by the sword; and, when major Rooke was here, they were meditating an expedition against Mayotta, which was in a state of rebellion. The natives, on being asked the cause of their war with that people, answered, "Mayotta like America." They get their supplies of arms and ammunition from ships that touch here; and it is customary for all to make presents of arms and powder to the prince when he pays a visit on board, which he does to every one. They have a regular form of government, and exercise the Mahometan religion; both being introduced by the Arabians. The colour of these two races of men is very different: the Arabs have not so deep a tinge as the others, being of a copper complexion, with better features and a more animated countenance. They consider a black streak under the eyes as ornamental; and this they make every day, at their toilettes, with a painting-brush dipt in a kind of ointment. The custom of chewing the betel-nut prevails greatly here, as in most of the eastern countries; and answers to the fashion of smoking tobacco or taking snuff with us, except that with them it is more general. No one is without a purse or bag of betel; and it is looked on as a piece of civility to offer it to your friend when you meet him, or take leave. Their religion licenses a plurality of wives, and likewise concubines. They are extremely jealous of them, and never allow any man to see the women: but female strangers are admitted into the haram; and some English ladies, whose curiosity has led them there, make favourable reports of their beauty, and richness of apparel, displayed in a profusion of ornaments of gold, silver, and beads, in form of necklaces, bracelets, and earrings: they wear half a dozen or more in each, through holes bored along the outer rim of the ear. The men seem not to

look with indifference on our fair countrywomen, notwithstanding they are of such a different complexion. One of the first rank among them being much smitten with a young English lady, wished to make a purchase of her at the price of 5000 dollars; but on being informed that the lady would fetch at least 20 times that sum in India, he lamented that her value was so far superior to what he could afford to give. They are very temperate and abstemious, wine being forbidden them by the law of Mahomet. They are frequent in prayer, attending their mosques three or four times a day. Strangers are allowed to enter them, on condition of taking off their shoes. In prayer the people prostrate themselves on the ground, frequently kissing it, and expressing very fervent devotion. Most of the people speak a little English; they profess a particular regard for our nation, and are very fond of repeating to you, that "Joanna-man and English-man all brothers;" and never fail to ask "how king George do?" In general, they appear to be a courteous and well disposed people, and very fair and honest in their dealings, though there are among them, as in all other nations, some viciously inclined; and theft is much practised by the lower class, notwithstanding the punishment of it is very exemplary, being amputation of both hands of the delinquent. The inhabitants, like those of most hot and tropical countries, are indolent, and do not improve by their labour the richness of that soil with which nature has blessed them. "Climate here," says major Rooke, "promotes vegetation to such a degree as requires little toil in the husbandman; but that little is denied; so that beyond oranges, bananas, pine-apples, cocoa-nuts, yams, and purslain (all growing spontaneously), few vegetables are met with. Nor are the natural beauties of the island inferior to its other advantages of plenty and fertility. The face of the country is very picturesque and pleasing, its scenes being drawn by the bold strokes of Nature's masterly pencil. Lofty mountains clothed to their very summits, deep and rugged valleys adorned by frequent cataracts, cascades, woods, rocks, and rivulets, intermixed in "gay theatric pride," form the landscape. Groves are seen extending over the plains to the very edge of the sea, formed principally by the cocoa-nut trees, whose long and naked stems leave a clear and uninterrupted passage beneath; while their tufted and over-spreading tops form a thick shade above, and keep off the scorching rays of the sun. In the interior part of the island, surrounded by mountains of a prodigious height, and about 15 miles from this town, is situated a sacred lake, half a mile in circumference. The adjacent hills, covered with lofty trees, and the unfrequented solitude of the place, seem more calculated to inspire religious awe in those who visit this sequestered spot, than any sanctity that is to be discovered in a parcel of wild ducks inhabiting it, which are deified and worshipped by the original natives, who consult them as their oracles on all important affairs, and sacrifice to them. Being extremely averse to conduct strangers there, they stipulate that all guns shall be left at a place five miles from the lake. The worship paid to these birds ensures their safety and tranquillity; and rendering them of course perfectly tame, they fearlessly approach any one who goes there. The Arabian part of the islanders hold this barbarous superstition in the utmost detestation; but dare not forbid the practice of it, so bigoted to it are the others. E. lon. 44. 15. S. lat. 12. 30. E.

HIO, a town of Sweden, in W. Gothland, seated on the Lake Wetter, 14.5 miles S. W. of Stockholm. E. long. 14. 0. N. lat. 57. 53.

HIP, in the materia medica, the fruit of the dog-rose or wild brier. See ROSA. They contain an acidulous, yet sweetish pulp; with a rough prickly matter inclosing the seeds, from which the pulp ought to be carefully separated before it be taken internally. The Wirtemberg college observes, that from a neglect of this caution, the pulp of hips sometimes occasions a

pruritus and uneasiness about the anus; and the conserve of it has been known to excite violent vomiting. The conserve is the only officinal preparation of this fruit, which does not possess any medical virtues, but is merely used by the apothecaries as a vehicle for other remedies.

HIPPARCHUS, a great astronomer, born at Nice in Bithynia, flourished between the 154th and 163d Olympiads. His Commentary upon Aratus's Phenomena is still extant. Rohault was very much mistaken when he asserted, that this astronomer was not acquainted with the particular motion of the fixed stars from west to east, by which their longitude changes. By foretelling eclipses, he taught mankind not to be frightened at them, and that even the gods were bound by laws. Pliny, who tells this, admires him for making a review of all the stars; by which his descendants would be enabled to discover whether they are born and die, whether they change their place, and whether they increase and decrease.

HIPPJA, in botany; a genus of the polygamia necessaria order, belonging to the syngenesia class of plants. The receptacle is naked; there is no pappus; the seeds are naked, with very broad margins; the calyx is hemispheric, and subimbricated; the radius consists of ten corollulæ, obscure, and rather cleft into three.

HIPPOBOSCA, or **HORSE-FLY**, in zoology; a genus of insects, belonging to the order of diptera. The beak consists of two valves, is cylindrical, obtuse, and hanging; and the feet have several claws. There are four species, distinguished by their wings, &c. The most remarkable is the equina, the pest of horses and cows. This insect is broad, flat, shining, and as it were scaly. Its head, thorax, and abdomen, are yellow, undulated with brown; and the legs are intersected with yellow and brown. The wings, crossed one over the other, exceed the length of the body by above one half; they are transparent, tinged with a little yellow towards their outward edge, and have a spot near that edge of a brown colour. These insects are very difficult to be killed on account of the hard crustaceous shell which covers them; and they fix so close and fast to the poor animals with their claws, that they cannot rub or bite them off without wounding themselves. See Plate 3.

HIPPOCAMPUS, in ichthyology. See **SYNGNATHUS**.

HIPPOCASTANUM, or common horse-chestnut. See **ÆSCULUS**. It may be here added, that from several experiments in the French *Memoires d'Agriculture*, it appears that the fruit of the horse-chestnut affords a wholesome nourishment for cattle, and may even be employed with success for fattening them. It is said to render the tallow of those fattened with it particularly firm. The milk yielded by cows fed upon it, is also said to be thicker and richer than that produced from any other kind of food. The fruit of this tree has been likewise used as food for sheep and poultry, and as soap for washing. It was much employed in powder as a sternutatory by an itinerant oculist, and has been recommended by some others in certain states of ophthalmia, headach, &c. in which errhines are indicated. Its effects as a sternutatory may also be obtained by using it under the form of infusion or decoction drawn up into the nostrils. It is entirely with a view to its errhine power that it has a place in the Pharmacopœia of the Edinburgh college. The bark has indeed been recommended by some as a cure for intermittent fevers; and it is probably with this intention that this part of the hippocastanum is introduced as an officinal article in the Pharmacopœia Rossica. During the late scarcity of grain, some attempts were made to obtain starch from the horse-chestnut, and not without success.

HIPPOCENTAUR, formed of ἵππος "horse," κεντεν *prungo*, "I spur," and ταυρος "bull," in antiquity, a fabulous monster, supposed to be half horse and half man. What gave occasion to the fable was, that a people of Thessaly, inhabiting near

mount Pelion, became thus denominated, because they were the first that taught the art of mounting on horseback; which occasioned some of their neighbours to imagine, that the horse and man made but one animal. The hippocentaurs should seem to have differed from the centaurs, in this, that the latter only rode on bullocks, and the former on horses, as the names themselves intimate.

HIPPOCRAS, a medicinal drink, composed of wine, with spices and other ingredients; much used among the French by way of a cordial dram after meals. There are various kinds of hippocras, according to the kind of wine and the other additional ingredients made use of; as white hippocras, red hippocras, claret hippocras, strawberry hippocras, hippocras without wine, cyder hippocras, &c.

That directed in the late London Dispensatory, is made of cloves, ginger, cinnamon, and nutmegs, grossly powdered and infused in canary with sugar; to the infusion, milk, a lemon, and some slips of rosemary, are put, and the whole strained through a flannel. It is recommended as a cordial, and proper in paralytic and nervous cases.

HIPPOCRATIA, in botany; a genus of the monogynia order, belonging to the triandria class of plants; and in the natural method ranking with those of which the order is doubtful. The calyx is quinquepartite; the petals five, the capsules three in number, and the latter of an obcordate shape.

HIPPOCRATES, the greatest physician of antiquity, was born in the island of Cos in the 80th Olympiad, and flourished at the time of the Peloponnesian war. He was the first that we know of who laid down precepts concerning physic; and, if we may believe the author of his Life, who goes under the name of *Soranus*, drew his original from *Hercules* and *Æsculapius*. He was first a pupil of his own father *Heraclides*, then of *Herodicus*, then of *Gorgias* of *Leontium* the orator, and, according to some, of *Democritus* of *Abdera*. After being instructed in physic, and in the liberal arts, and losing his parents, he left his own country, and practised physic all over Greece; where he was so much admired for his skill, that he was publicly sent for with *Euryphon*, a man superior to him in years, to *Perdiccas* king of *Macedonia*, who was then thought to be consumptive. But *Hippocrates*, as soon as he arrived, pronounced the disease to be entirely mental, as in truth it was. For upon the death of his father *Alexander*, *Perdiccas* fell in love with *Philas*, his father's mistress: and this *Hippocrates* discerning by the great change her presence always wrought upon him, a cure was soon effected.

Being entreated by the people of *Abdera* to come and cure *Democritus* of a supposed madness, he went; but, upon his arrival, instead of finding *Democritus* mad, he found all his fellow citizens so, and *Democritus* the only wise man among them. He heard many lectures, and learned much philosophy from him; which has made *Cornelius Celsus* and some others imagine, that *Hippocrates* was the disciple of *Democritus*, though it is probable they never saw each other till this interview which was occasioned by the *Abderites*. *Hippocrates* had also public invitations to other countries. Thus, when a plague invaded the *Illyrians* and *Pæonians*, the kings of those countries begged him to come to their relief: he did not go; but learning from the messengers the course of the winds there, he concluded that the distemper would come to *Athens*; and, foretelling what would happen, applied himself to take care of the city and the students. He was indeed such a lover of Greece, that when his fame had reached as far as *Persia*, and upon that account *Artaxerxes* had entreated him by his governor of the *Hellepont*, with a promise of great rewards, to come to him, he refused to go. He also delivered his own country from a war with the *Athenians*, that was just ready to break out, by prevailing with the *Thessalians* to come to their assistance, for

which he received very great honours from the Coans. The Athenians also conferred great honours upon him: they admitted him next to Hercules in the Eleusinian ceremonies; gave him the freedom of the city; and voted a public maintenance for him and his family in the prytanæum or council-house at Athens, where none were maintained at the public charge but such as had done signal service to the state. He died among the Larissæans, some say in his 60th year, some in his 85th, others in his 104th, and some in his 109th. The best edition of his works is that of Foesius, in Greek and Latin. Hippocrates wrote in the Ionian dialect. His aphorisms, prognostics, and all that he has written on the symptoms of diseases, justly pass for masterpieces.

HIPPOCRENE, in ancient geography, a fountain of mount Helicon, on the borders of Bœotia, sacred to the Muses. Some, as Ovid, make Hippocrene and Aganippe the same. See **AGANIPPE**.

HIPPOPHAGI, in ancient geography, a people of Scythia, so called from their living on horse-flesh; the same at this day of the Tartars their descendants. Also a people of Persia (Ptolemy).

HIPPOCREPIS, COMMON HORSE-SHOE VETCH, in botany; a genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The legumen is compressed and crooked, with many incisions on the interior suture. There are three species, two natives of the warm parts of Europe, and one of Britain. They are all low herbaceous trailing plants, with yellow flowers. They are propagated by seeds; but having no great beauty are seldom kept in gardens.

HIPPODROME, **HIPPODROMUS** (composed of ἵππος "horse," and δρόμος "course," of the verb δρέω *curro*, "I run"), in antiquity, a list or course wherein chariot and horses races were performed, and horses exercised. The Olympian hippodrome or horse-course was a space of ground of 600 paces long, surrounded with a wall, near the city of Elis, and on the banks of the river Alpheus. It was uneven, and in some degree irregular, on account of the situation; in one part was a hill of a moderate height, and the circuit was adorned with temples, altars, and other embellishments. See **STADIUM**. There is a very famous hippodrome at Constantinople, which was begun by Alexander Severus, and finished by Constantine. This circus, called by the Turks *atmeican*, is 400 paces long, and above 100 paces wide. At the entrance of the hippodrome there is a pyramidal obelisk of granite in one piece, about 50 feet high, terminating in a point, and charged with hieroglyphics. The Greek and Latin inscriptions on its base shew, that it was erected by Theodosius; the machines that were employed to raise it are represented upon it in basso-relievo. We have some vestiges in England of the hippodromus, in which the ancient inhabitants of this country performed their races; the most remarkable is that near Stonehenge, which is a long tract of ground, about 350 feet, or 200 druid cubits wide, and more than a mile and three quarters, or 6000 druid cubits, in length, inclosed quite round with a bank of earth, extending directly east and west. The goal and career are at the east end. The goal is a high bank of earth, raised with a slope inwards, on which the judges are supposed to have sat. The metæ are two tumuli, or small barrows, at the west end of the course. These hippodromes were called in the language of the country *rbedagua*, the racer *rbedagur*, and the carriage *rbeda*, from the British word *rbedeg* "to run." One of these hippodromes, about half a mile to the southward of Leicester, retains evident traces of the old name *rbedagua*, in the corrupted one of *rawdikes*. There is another of these, says Dr. Stukely, near Dorchester; another on the banks of the river Lowther, near Penrith in Cumberland; and another in the valley, just without the town of Royston.

HIPPOGLOSSUS, in ichthyology; a species of **PLEURO-NECTES**.

HIPPOLYTUS, a son of Theseus and Hippolyte, famous in fabulous history for his virtue and his misfortunes. His step-mother Phædra fell in love with him, and when he refused to pollute his father's bed, she accused him to Theseus of offering violence to her person. Her accusation was readily believed, and Theseus entreated Neptune to punish the incontinence of his son. Hippolytus fled from the resentment of his father; and as he pursued his way along the sea shores, his horses were so frightened at the noise of sea calves which Neptune had purposefully sent there, that they ran among the rocks till his chariot was broken and his body torn to pieces. Temples were raised to his memory, particularly at Trœzene, where he received divine honours. According to some accounts, Diana restored him to life.

HIPPOMANE, the **MANCHINEEL-TREE**, a genus of the monadelphia order belonging to the monœcia class of plants; and in the natural method ranking under the 38th order, *Tricoccæ*. The male has an amentum and bifid perianthium, without any corolla; the female perianthium is trifid; there is no corolla; the stigma is tripartite; and the plum or capsule tricoccus. See Plate 10. The *Species* are, 1. The *mancinella*, with oval sawed leaves, is a native of all the West India islands. It hath a smooth brownish bark; the trunk divides upward into many branches, garnished with oblong leaves about three inches long. The flowers come out in short spikes at the end of the branches, but make no great appearance, and are succeeded by fruit of the same shape and size with a golden pippin. The tree grows to the size of a large oak. 2. The *biglandulosa*, with oblong bay-leaves, is a native of South-America; and grows to as large a size as the first, from which it differs mostly in the shape of its leaves. 3. The *spinosa*, with holly-leaves, is a native of Campeachy, and seldom rises above 20 feet high; the leaves greatly resemble those of the common holly, and are set with sharp prickles at the end of each indenture. They are of a lucid green, and continue all the year.

These plants being natives of very warm climates, cannot be preserved in this country without a stove; nor can they by any means be made to rise above five or six feet high even with that assistance. They are propagated by seeds; but must have very little moisture, or they will certainly be killed by it.

These trees have a very poisonous quality, abounding with an acrid milky juice of a highly caustic nature. Strangers are often tempted to eat the fruit of the first species; the consequences of which are, 2. inflammation of the mouth and throat, pains in the stomach, &c. which are very dangerous unless remedies are speedily applied. The wood is much esteemed for making cabinets, book-cases, &c. being very durable, taking a fine polish, and not being liable to become worm-eaten: but as the trees abound with a milky caustic juice already mentioned, fires are made round their trunks, to burn out this juice; otherwise those who fell the trees would be in danger of losing their sight by the juice flying in their eyes. This juice raises blisters on the skin wherever it falls, turns linen black, and makes it fall out in holes. It is also dangerous to work the wood alter it is sawn out; for if any of the saw-dust happens to get into the eyes of the workmen, it causes inflammation; to prevent which, they generally cover their faces with fine lawn during the time of working the wood. It is with the juice of this tree that the Indians used to poison their arrows.

HIPPOMANES, a sort of poison famous among the ancients as an ingredient in amorous philters or love-charms. The word is Greek, ἵππομανης, composed of ἵππος; "a horse," and μανία "fury or madness!" Authors are not agreed about the nature of the hippomanes. Pliny describes it as a blackist caruncle found on the head of a new-born colt; which the dam

bites off and eats as soon as she is delivered. He adds, that if she be prevented herein by any one's cutting it off before, she will not take to nor bring up the young. Virgil, and after him Servius and Columella, describe it as a poisonous matter trickling from the pudendum of a mare when proud, or longing for the horse. At the end of Mr. Bayle's Dictionary is a very learned dissertation on the hippomanes, and all its virtues both real and pretended.

HIPPONAX, a Greek poet, born at Ephesus 540 years before the Christian era. He cultivated the same satirical poetry as Archilochus, and was not inferior to him in the beauty or vigour of his lines. His satirical raillery obliged him to fly from Ephesus. As he was naturally deformed, two brothers, Buphalus and Anthermus, made a statue of him; which, by the ugliness of its features, exposed the poet to universal ridicule. Hipponax resolved to revenge the injury; and he wrote such bitter invectives and satirical lampoons against them, that they hanged themselves in despair. *Cic. ad Famil. vii. ep. 24.*

HIPPOPHAE, SEA-BUCKTHORN; a genus of the tetrandria order, belonging to the diœcia class of plants; and in the natural method ranking under the 16th order, *Calycifloræ*. The male calyx is bipartite; there is no corolla: the female calyx is blind; there is no corolla; there is one style, and a monospermous berry. The *Species* are 1. The *rharnoides*, with a shrubby stem, branching irregularly eight or ten feet high, having a dark brown bark. It is armed with a few thorns, hath spear-shaped, narrow, sessile leaves, of a dark green above, and hoary underneath. 2. The *canadensis* hath a shrubby brown stem, branching eight or ten feet high, with oval leaves, and male and female flowers on different plants. Both these species are very hardy, and may be propagated in abundance by suckers from the roots, by layers, and by cuttings of their young shoots. They are retained in gardens on account of their two-coloured leaves in summer; and in winter, on account of the appearance of the young shoots, which are covered with turgid, irregular, scaly buds. Goats, sheep, and horses, eat the first species; cows refuse it.

HIPPOPODES, HIPPOPEDES, or *Hippopodæ*, composed of *ἵππος* horse, and *πὸς* foot, in the ancient geography, an appellation given to a certain people situated on the banks of the Scythian sea, as being supposed to have had horses' feet. The hippopodes are mentioned by Dionysius, *Geogr. v. 310*. Mela, *lib. iii. cap. 6*. Pliny, *lib. iv. cap. 13*. and St. Augustine, *De Civit. lib. xvi. cap. 8*. But it is conjectured, that they had this appellation given them on account of their swiftness or lightness of foot. Mr. Pennant supposes them to have been the inhabitants of the Bothnian Gulph, and that they were the same sort of people as the *Finni Lignipedes* of Olaus. They wore snow shoes; which he thinks might fairly give the idea of their being, like horses, hoofed and shod.

HIPPOPOTAMUS, the RIVER-HORSE; a genus of quadrupeds belonging to the order of belluæ, the characters of which are these: It has four fore-teeth in the upper jaw, disposed in pairs at a distance from each other; and four prominent fore-teeth in the under jaw, the intermediate ones being longest. There are two tusks in each jaw, those of the under one very long and obliquely truncated; in both they stand solitary, and are recurvated. The feet are hoofed on the edges.

There is but one known species, *viz.* the amphibius, or river-horse. See plate 4. The head of this animal is of an enormous size, and the mouth vastly wide. The ears are small and pointed, and lined within very thickly with short fine hairs. The eyes and nostrils are small in proportion to the bulk of the animal. On the lips are some strong hairs scattered in patches here and there. The hair on the body is very thin, of a whitish colour, and scarce discernible at first sight. There is no mane on the neck, as some writers assert, only the hairs on that part

are rather thicker. The skin is very thick and strong, and of a dusky colour. The tail is about a foot long, taper, compressed, and naked. The hoofs are divided into four parts. The legs are short and thick. In bulk it is second only to the elephant. The length of a male has been found to be 17 feet, the circumference of the body 15, the height near 7, the legs near 3, the head above 3½, and the girth near 9. The mouth, when open, is above two feet wide; and furnished with 44 teeth of different figures (including the cutting teeth and the canine). The cutting, and particularly the canine teeth of the lower jaw, are very long, and so hard and strong that they strike fire with steel. This circumstance, it is probable, gave rise to the fable of the ancients, that the hippopotamus vomited fire from his mouth. The substance of the canine teeth is so white, so fine, and so hard, that it is preferable to ivory for making artificial teeth. The cutting teeth, especially those of the under jaw, are very long, cylindrical, and chamfered. The canine teeth are also long, crooked, prismatic, and sharp, like the tusks of the wild boar. The grinders are square or oblong, like those of man, and so large that a single tooth sometimes weighs three pounds. The tusks, according to Dr. Sparman, are 27 inches long. With such powerful arms, and such a prodigious strength of body, the hippopotamus might render himself formidable to every other animal. But he is naturally of a mild disposition, and is only formidable when provoked. His bulk is so great, that twelve oxen have been found necessary to draw one ashore which had been shot in a river above the Cape; and Hasselquist says, its hide is a load for a camel. Tho' he delights in the water, and lives in it as freely as upon land; yet he has not, like the beaver or otter, membranes between his toes. The great size of his belly renders his specific gravity nearly equal to that of water, and makes him swim with ease.

These animals inhabit the rivers of Africa, from the Niger to Berg River, many miles north of the Cape of Good Hope. They formerly abounded in the rivers nearer the Cape, but are now almost extirpated; and to preserve the few which are left in Berg River, the governor has absolutely prohibited the shooting them without particular permission. They are not found in any of the African rivers which run into the Mediterranean except the Nile, and even there only in Upper Egypt, and in the fens and lakes of Ethiopia which that river passes through. From the unwieldiness of his body and the shortness of his legs, the hippopotamus is not able to move fast upon land, and is then extremely timid. When pursued, he takes to the water, plunges in, sinks to the bottom, and is seen walking there at full ease; he cannot, however, continue there long without often rising towards the surface; and in the daytime is so fearful of being discovered, that when he takes in fresh air, the place is hardly perceptible, for he does not venture even to put his nose out of the water. In rivers unfrequented by mankind, he is less cautious, and puts his whole head out of the water. If wounded, he will rise and attack boats or canoes with great fury, and often sink them by biting large pieces out of the sides: and frequently people are drowned by these animals; for they are as bold in the water as they are timid on land. It is reported that they will at once bite a man in two. In shallow rivers the hippopotamus makes deep holes in the bottom, in order to conceal his great bulk. When he quits the water, he usually puts out half his body at once, and smells and looks around; but sometimes rushes out with great impetuosity, and tramples down every thing in his way. During the night he leaves the rivers in order to pasture; when he eats sugar-canes, rushes, millet, rice, &c. consuming great quantities, and doing much damage in the cultivated fields. But as he is so timid on land, it is not difficult to drive him off.—The Egyptians (Mr. Hasselquist informs us) “ have a curious manner of freeing

hemselves in some measure from this destructive animal. They remark the places he frequents most, and there lay a great quantity of pease: when the beast comes on shore hungry and voracious, he falls to eating what is nearest him; and filling his belly with the pease, they occasion an unsupportable thirst: he then returns immediately into the river, and drinks upon these dry pease large draughts of water, which suddenly causes his death; for the pease soon begin to swell with the water, and not long after the Egyptians find him dead on the shore, blown up, as if killed with the strongest poison." The river-horse also feeds on the roots of trees, which he loosens with his great teeth; but never eats fish, as is asserted by Dampier. It was reported to M. Hasselquist, that the river-horse is an inveterate enemy to the crocodile; and kills it whenever he meets it, and that this, with some other causes, contributes much to the extirpation of the crocodile; which otherwise, considering the many eggs they would lay, would utterly destroy Egypt. But Mr. Pennant treats the alleged enmity of the hippopotamus and crocodile as a vulgar error; an eye-witness, he tells us, declaring he had seen them swimming together without any disagreement.—The hippopotami sleep in the reedy-islands in the middle of the stream, and on which they bring forth their young. A herd of females has but a single male: they bring one young at a time, and that on the land, but suckle it in the water.—They are capable of being tamed. Belon says, he has seen one so gentle as to be let loose out of a stable and fed by its keeper without attempting to injure any one. They are generally taken in pitfalls, and the poor people eat the flesh. In some parts the natives place boards full of sharp irons in the corn-grounds; which these beasts strike into their feet, and so become an easy prey. Sometimes they are struck in the water with harpoons fastened to cords, and 10 or 12 canoes are employed in the chase.

The hippopotamus was known to the Romans. Scaurus treated the people with the sight of five crocodiles and one hippopotamus during his ædileship, and exhibited them in a temporary lake. Augustus produced one at his triumph over Cleopatra.

This animal is the behemoth of Job; who admirably describes its manners, its food, and its haunts. "1. Behold now behemoth, which I made near thee: he eateth grass as an ox. 2. Lo! now his strength is in his loins, and his force is in the navel of his belly. 3. His bones are as strong pieces of brass; his bones are like bars of iron. 4. He lieth under the shady trees, in the covert of the reed and fens. 5. Behold! he drinketh up a river: he trusteth he can draw up Jordan into his mouth." The first, the learned Bochart observes, implies the locality of its situation; being an inhabitant of the Nile, in the neighbourhood of Uz, the land of Job. The second describes its great strength; and the third, the peculiar hardness of its bones. The fourth indicates its residence amidst the vast reeds of the river of Egypt, and other African rivers overshadowed with thick forests. The fifth, the characteristic wideness of its mouth; which is hyperbolically described as large enough to exhaust such a stream as Jordan.

An entertaining account of the hippopotamus is given in Sparman's Voyage to the Cape of Good Hope, where these animals are called *sea-cows*. We shall here introduce a few particulars relative to the Hippopotamus Calf, which Mr. Sparman and his Hottentots had the good fortune to take.

"While the calf was yet alive (says he), I made a drawing of it, a copy of which may be seen in the Swedish Transactions for 1778. After this it was killed, dissected, and eaten up in less than three hours time. The reason of this quick dispatch was partly the warmth of the weather, and partly our being in absolute want of any other fresh provisions. We found the flesh and fat of this calf as flabby as one might have

expected from its want of age, and consequently not near so good as that of the old sea-cows; of which I found the flesh tender, and the fat of a taste like marrow, or at least not so greasy and strong as other fat. It is for this reason likewise that the colonists look upon the flesh and fat of the sea-cow as the wholesomest meat that can be eaten; the gelatinous part of the feet in particular, when properly dressed, being accounted a great delicacy. The dried tongues of these animals are also considered, even at the Cape, as a rare and savoury dish. On my return to Sweden, I had the honour to furnish his majesty's table with a dried sea-cow's tongue, two feet and eight inches long. With respect to form, the tongue of a full-grown hippopotamus is very blunt at the tip, and is in fact broadest at that part; if at the same time it is flanted off towards one side, and marked with lobes, as I was informed it is, this circumstance may, perhaps, proceed from the friction it suffers against the teeth, towards the side on which the animal chiefly chews; at least some traces of this oblique form were discoverable on the dried tongue I am speaking of.

"The hide of the adult hippopotamus bears a great resemblance to that of the rhinoceros, but is rather thicker. Whips likewise made of this hide are stronger, and, after being used some time, are more pliable than those made of the hide of the rhinoceros usually are, though they are not so transparent as these latter are when new.

"The food of the hippopotamus consists entirely of herbs and grass, a circumstance of which we are informed by Father Lobo; and which may partly be inferred from what I have already said on the subject, as well as from the figure of the stomach belonging to the fœtus of a hippopotamus given in Messrs de Buffon and Daubenton's elegant work. I therefore do not look upon it as very probable, that these animals, agreeably to the assertions of M. de Buffon, p. 93. or of Dampier in his Voyage, should hunt after fish by way of preying upon them; especially as in some of the rivers of the southern part of Africa, where the sea-cows are seen daily and in great abundance, there is not a fish to be seen; and in others only a few bastard springers, as they are called (*cyprinus gonorynchus*), which are scarcely as big as a common herring. It is said, that a small species of carp is still more rarely to be met with here. It is true, that the sea-cows sometimes frequent the mouths of the rivers here, which are full of sea-fish, and even sometimes the sea itself: we know, however, that these huge quadrupeds are notwithstanding this obliged to go from thence upon dry land in quest of food. Neither is it probable that they can drink the sea-water; as an instance was related to me of the contrary in a hippopotamus, which, having been disturbed in the rivers, had taken refuge in the sea, and yet was obliged to go ashore every night and drink fresh water from a well in the neighbourhood, till at last it was shot by some people that lay in wait for it there. That the hippopotamuses actually lived in salt-water, I have seen evident proofs at the mouths both of *Kromme* and *Cantour* rivers, particularly in the latter, on my journey homewards; where many of these animals blew themselves in broad day light, and thrust their heads up above the water; and one of them in particular, which had been wounded by an ill directed shot on the nose, neighed from anger and resentment. In Krakekanima I saw on the beach manifest traces of a hippopotamus which had come out of the sea, but had retired thither again directly. That very attentive navigator Captain Burtz informed me, that he had frequently seen on the eastern coast of Africa sea-horses (meaning probably the hippopotamus) raise their heads above the surface of the water in order to blow themselves and neigh. I have been induced to be rather circumstantial on this subject, as M. Adanson had taken it into his head, in his *Voyage au Senegal*, to limit the

abode of the hippopotamus to the fresh water rivers only in Africa; and M. de Buffon has taken upon him to support this opinion, and to render Kolbe's testimony to the contrary liable to suspicion.

"An old experienced huntsman told me, that he had once seen two hippopotamuses copulate, which they did in the same manner as common cattle. On this occasion the beasts stood in a shallow part of the river, where the water reached up to their knees.

"The method of catching the hippopotamus consists (besides shooting it) in making pits for it in those parts which the animal passes in his way to and from the river: but this method is peculiar to the Hottentots; and is only practised by them in the rainy season, as the ground in summer is too hard for that purpose. It is said that they have never succeeded in killing this huge aquatic animal with poisoned darts, though this way of killing game is practised with advantage by the Hottentots for the destruction both of the elephant and rhinoceros. The colonists likewise were not entirely unacquainted with the method mentioned by M. Hasselquist, as being common in Egypt, viz. to strew on the ground as many peas or beans as the animal can possibly eat, by which means it bursts its belly and dies. But as this method is very expensive, and they can generally have this animal for a single charge of powder and a tin ball, shot in a proper direction, they chiefly and almost solely have recourse to this cheaper expedient.

"The hippopotamus is not so quick in its pace on land as the generality of the larger quadrupeds, though perhaps it is not so slow and heavy as M. de Buffon describes it to be; for both the Hottentots and Colonists look upon it as dangerous to meet a hippopotamus out of the water, especially as, according to report, they had had a recent instance of one of these animals, which, from certain circumstances, was supposed to be in rut, having for several hours pursued a Hottentot, who found it very difficult to make his escape. The people of this country did not entertain that opinion of the medicinal virtues of the hippopotamus, as they did of certain parts of the elephant and rhinoceros; excepting one colonist, who imagined he had found the *os petrosum* of this animal, reduced to powder and taken in the quantity that would lie on the point of a knife, excellent for convulsions (*Stuyven*) in children. That the flesh is reckoned very wholesome food, I have already mentioned.

"Having already exceeded the limits I had prescribed to myself, I do not intend to dwell here on the anatomy of the hippopotamus we caught, particularly as the internal conformation of the calves is somewhat different from that of the adult animal. I shall therefore only briefly mention the following particulars: the stomachs were four in number, and consequently one more than in the *sætus* examined by M. Daubenton, which was kept in spirits. Compare Buffon, tom. xiii. tab. iv. fig. 2. The two first stomachs were each of them about seven inches long and three inches in diameter; the third was nine inches in length, and a little wider than the two former; the fourth was seven inches long, and at the upper part five inches broad, but decreased by degrees on one side till it terminated in the *pylorus*, which had an aperture an inch in width, being about half as wide again as the *cardia*. I did not observe any such valves as M. Daubenton has delineated. The first stomach we found mostly empty, it containing only a few lumps of cheese or curd; it likewise differed from the rest by the superior fineness of its internal coat. The internal membrane of the second stomach was rather coarser, and had many small holes in it; it likewise contained several clods of caseous matter, together with a great quantity of sand and mud. The third stomach had very visible folds, both longitudinal and

transversal, on the inside of it, and contained caseous lumps of a yellow colour and harder consistence than the others, together with several leaves quite whole and fresh, and at the same time some dirt. The interior membrane of the fourth stomach was very smooth, though it was not without folds; in the stomach itself there was a good deal of dirt, with a small quantity of curds, which were whiter than they were in any of the other stomachs. This fourth stomach in a great measure covered the rest, being situated on the right side of the animal, and was found to have the upper part of the melt adhering to its superior and interior edge. This latter viscus, which was one foot long and three inches broad, diverged from it downwards on the left side. The intestinal canal was 109 feet long; the liver measured 14 inches from right to left, and 7 or 8 from the hind part to the fore part. On its anterior edges it had a large notch, being in other respects undivided and entire; it was of an oblique form, being broadest towards the left side, where I discovered a gall-bladder five inches in length. In the uterus there was nothing particularly worthy of observation. I found two teats, and the heart surrounded with much fat; the length of this muscle was five inches, and the breadth about four inches and a half. The communication between the anricles, called the *foramen ovale*, was above an inch in diameter. Each lung was eleven inches long, and undivided: but at the superior and exterior parts of the right lung, there were two globules or processes, elevated half an inch above the surface; and on the side corresponding to it, in the left lung, and in the upper part of it, there was a little excrescence, terminating in a point: somewhat below this, yet more forwards, there was found likewise a process half an inch in height. Directly over the lower part of the communication formed between the right and left lung, there was a kind of crest or comb, measuring an inch from the top to the basis.

"One of my brother sportsmen said, he had once observed a peculiar kind of vermin on the body of one of these amphibious animals; but on the calf we had caught we found nothing but a species of leech, which kept only about the anus, and likewise a good way up in the strait gut, where, by a timely abstraction of the blood, they may be of use to these large amphibious animals; and particularly may act as preservatives against the piles, repaying themselves for their trouble in kind. Most of them were very small; but on the other hand there was a considerable number of them. The only large one I saw of this species, being somewhat more than an inch in length, I described and made a drawing of: this is inserted by the name of the *Hirudo Capensis, corpore supra nigricante, medio longitudinaliter sub-brunneo, subtus pallide fusco*, in the elegant Treatise on Worms, which M. Adolphus Nodaer, first secretary of the Patriotic Society, is preparing for the press. Instead of the lighter coloured streak upon the back, there was discoverable in some of these leeches one and sometimes two longitudinal brownish lines, which grew fainter and fainter towards the extremities.

"The huge animal of which we have been speaking, has doubtless obtained its present name of hippopotamus, which signifies river-horse, merely in consequence of the neighing sound it makes; as otherwise in its form it bears not the least resemblance to a horse, but rather to a hog. Neither does it in the least resemble the ox; so it could be only the different stomachs of this animal which could occasion it to be called *sea-cow* at the Cape; and perhaps it is for the same reason that the Hottentots call it the *t'gao*, which nearly approaches to *t'kau*, the name by which the buffalo is known among these people.

"From the account given by Bellonius of a tame hippopotamus, which he describes as a beast of a very mild and gentle nature, as well as from the disposition of the calf we had just caught, it follows, that this animal might be easily brought

over to Europe, where it has been formerly exhibited at two different times in the public spectacles at Rome. For this purpose, the capture might easiest be made at Konaps-river, where these animals, according to the accounts given me by the Caffres, reside in great abundance; and milch cows might be kept ready at hand, in order to rear the calf in case it was a suckling. Indeed I am apt to suppose, that one a little older than this would not be very nice in its food; as that which we caught was induced by hunger, as soon as it was let loose near the waggon, to put up with something not extremely delicate, which had been just dropped from one of our oxen. This perhaps may appear very extraordinary in an animal with four stomachs; but there have been instances of this kind known in common cattle, which in Herjedal are partly fed with horse-dung. Vide A. A. Hulpers's *Beskrifning om Norrland*, 3: je. Saml. om Herjedalen (*Hulpers's Description of Norway*), p. 27—87. I have been likewise assured, that this method of feeding cattle has been practised with great advantage in Uplandia, when there has been a scarcity of fodder; and that afterwards these same cattle, even when they have not been in want of proper fodder, have taken to this food of their own accord, and eaten it without any thing else being mixed with it."

HIPPURIS, MARE'S-TAIL; a genus of the monogynia order, belonging to the monandria class of plants; and in the natural method ranking under the 15th order, *Inundatae*. There is no calyx, nor any petals; the stigma is simple; and there is one seed. There is only one species, a native of Britain, and which grows in ditches and stagnant waters. The flower of this plant is found at the base of each leaf, and is as simple as can be conceived; there being neither empalement nor blossom; and only one chive, one pointal, and one seed. It is a very weak astringent. Goats eat it; cows, sheep, horses, and swine, refuse it.

HIRÆA, in botany; a genus of the trigynia order, belonging to the decandria class of plants. The calyx is pentaphyllous; the petals roundish and unguiculated; there are three bilabiated seeds.

HIRAM, a king of Tyre, contemporary with Solomon, whom he supplied with cedar, gold, silver, and other materials for building the temple. He died 1000 years B. C.

HIRAM of Tyre, an artist who assisted in the construction of Solomon's temple, and other public buildings at Jerusalem, flourished 1015 B. C.

HIRCANIA, in ancient geography. See **HYRCANIA**.

HIRCH-HORN, a town of Germany, in the circle of the Lower Rhine, with a strong castle. It is seated on the side of a hill on the river Neckar, and belongs to the elector palatine. E. long. 9. 0. N. lat. 49. 28.

HIRÉ (Philip de la), an eminent French mathematician and astronomer, born at Paris in 1640. His father, who was painter in ordinary to the king, designed him for the same profession: but he devoted himself to mathematical studies, and was nominated together with M. Picard to make the necessary observations for a new map of France, by the directions of M. Colbert. In 1683, he was employed in continuing the famous meridian line begun by M. Picard; and was next engaged in constructing those grand aqueducts which were projected by Louis XIV. He died in 1718, after having written a great number of works, besides several occasional papers dispersed in Journals, and in Memoirs of the Academy of Sciences.

HIRING, in law. See **BORROWING** AND **HIRING**.

HIRPINI, in ancient geography, a people of Italy, next to the Samnites, to the south-east, and descendants from them; situated to the north of the Picentini, and to the west of the Apuli, having on the north the Apennin and a part of Samnium. The name is from *Hirpus*, a term denoting a wolf in

their language; either because under the conduct of this animal the colony was led and settled, according to Strabo; or because, like that prowling animal, they lived on plunder, according to Servius.

HIRSBERG, a town of Silesia, famous for its mineral baths. It is seated on the river Bosar, 44 miles S. W. of Breslaw.

HIRSCHFELD, a town of Germany, in the circle of the Upper Rhine, capital of a principality of the same name, depending on a famous abbey, which was secularized in favour of the house of Hesse Cassel. It is seated on the river Fulde, 16 miles N. E. of the town of Fulde, and 32 S. E. of Cassel. E. lon. 9. 50. N. lat. 50. 56.

HIRTELLA, in botany; a genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking with those of which the order is doubtful. There are five petals; the filaments are very long, persisting, and spiral; the berry is monopermious; the style lateral.

HIRUDO, the **LEECH**; a genus of insects belonging to the order of vermes intestina. The body moves either forward or backward. There are several species, principally distinguished by their colour. See plate 3. The most remarkable are the following:

1. The *medicinalis*, or medicinal leech, the form of which is well known, grows to the length of two or three inches. The body is of a blackish-brown colour, marked on the back with six yellow spots, and edged with a yellow line on each side; but both the spots and the lines grow faint, and almost disappear, at some seasons. The head is smaller than the tail, which fixes itself very firmly to any thing the creature pleases. It is viviparous, and produces but one young one at a time, which is in the month of July. It is an inhabitant of clear running waters, and is well known for its use in bleeding.
2. The *sanguisuga*, or horse-leech, is larger than the former. Its skin is smooth and glossy; the body is depressed, the back is dusky; and the belly is of a yellowish green, having a yellow lateral margin. It inhabits stagnant waters.
3. The *geometra*, or geometrical leech, grows to an inch and a half in length; and has a smooth and glossy skin of a dusky-brown colour, but in some seasons greenish spotted with white. When in motion, its back is elevated into a kind of ridge: and it then appears as if measuring the space it passed over like a compass, whence its name. Its tail is remarkably broad; and it holds as firmly by it as by the head. It is common on stones in shallow running waters; and is often found on trout and other fish after the spawning season.
4. The *muricata*, or muricated leech, has a taper body, rounded at the greater extremity, and furnished with two small tentacula, or horns, strongly annulated and rugged upon the rings, the tail dilated. It inhabits the Atlantic Ocean, and is by the fishermen called the *sea-leech*. It adheres to fish, and generally leaves a black mark on the spot.

The organs of generation in leeches are formed like those of the sea and land snails. See **HELIX**. The leech's head is armed with a sharp instrument that makes three wounds at once. They are three sharp tubercles, strong enough to cut through the skin of a man, or even of an ox or horse. The mouth is as it were the body of the pump, and the tongue or fleshy nipple the sucker; by the working of this piece of mechanism, the blood is made to rise up to the conduit which conveys it to the animal's stomach, which is a membranaceous skin divided into 24 small cells. The blood which is sucked out is there preserved for several months almost without coagulating, and proves a store of provision to the animal. The nutritious parts, pure and already digested by animals, have no call to be disengaged from the heterogeneous substances: nor indeed is there an anus discoverable in the leech; mere transpiration seems to be all that it performs, the matter fixing on the surface of its body, and afterwards coming off in small threads. Of this an experi-

ment may be tried by putting a leech into oil, where it keeps alive for several days; upon being taken out and put into water, there appears to loosen from its body a kind of slough shaped like the creature's body. The organ of respiration, though unascertained, seems to be situated in the mouth; for if, like an insect, it drew its breath through vent holes, it would not subsist in oil, as by it they would be stopped up. *Barbul's Genera Vermium*, p. 21.

It is only the first species that is used in medicine; being applied to the skin in order to draw off blood. With this view they are employed to phlebotomize young children. If the leech does not fasten, a drop of sugared milk is put on the spot it is wished to fix on, or a little blood is drawn by means of a slight puncture, after which it immediately settles. The leech when fixed should be watched, lest it should find its way into the anus when used for the hemorrhoids, or penetrate into the œsophagus if employed to draw the gums; otherwise it would make great havoc in the stomach or intestines. In such a case, the best and quickest remedy is to swallow some salt; which is the method practised to make it loose its hold when it sucks longer than was intended. Salt of tartar, volatile alkali, pepper, and acids, make it also leave the part on which it was applied. Cows and horses have been known to receive them, in drinking, into the throat. The usual remedy is to force down some salt, which makes them fall off. If, on the contrary, it is intended that the leech should draw a larger quantity of blood, the end of its tail is cut off; and it then sucks continually to make up the loss it sustains. The discharge occasioned by the puncture of a leech is usually of more service than the process itself. When too abundant, it is easily stopped with brandy, vinegar, or other styptics, or with a compress of dry linen rag bound strongly on the bleeding orifice.

At Ceylon, travellers who walk bare-legged are molested by the great numbers of leeches concealed under the grass. All leeches vary in their colours at some seasons, but they are generally of a dusky greenish brown or yellow, and often variegated. They are said to be very restless before a change of weather, if confined in glasses.

HIRUNDO, in ornithology, a genus of birds of the order of passerines. See plate 10. There are 37 species, chiefly distinguished by their colour. The most remarkable are,

1. The *rufica*, common or chimney-swallow, is distinguished from all the other species by the superior forkiness of its tail, and by the red spot on the forehead and under the chin. The crown of the head, the whole upper part of the body, and the coverts of the wings, are black, glossed with a rich purplish blue, most resplendent in the male: the breast and belly white, and in the male tinged with red: the tail is black; the two middle feathers are plain, the others marked transversely near their ends with a white spot: the exterior feathers of the tail are much longer in the male than in the female. The food of this swallow is the same with the others of its kind, viz. insects. For the taking of these, in their swiftest flight, nature has admirably contrived their several parts: their mouths are very wide to take in flies, &c. in their quickest motions; their wings are long, and adapted for distant and continual flight; and their tails are forked, to enable them to turn the readier in pursuit of their prey. This species is the first comer of all the British hirundines; and appears in general on or about the 13th of April, though now and then a straggler is seen much earlier. This hirundo, though called the chimney-swallow, by no means builds altogether in chimneys, but often within barns and out-houses against the rafters; and so she did in Virgil's time:

Ante
Garrula quàm tignis nidos suspendat hirundo.

In Sweden she builds in barns, and is called *ladu swala*, the barn swallow. Besides, in the warmer parts of Europe, there are no chimneys to houses except they are English built: in these countries she constructs her nest in porches, and gateways, and galleries, and open halls. Here and there a bird may affect some odd peculiar place: but in general, with us, this species breeds in chimneys; and loves to haunt those stacks where there is a constant fire, no doubt for the sake of warmth. Not that it can subsist in the immediate shaft where there is a fire; but prefers one adjoining to that of the kitchen, and disregards the perpetual smoke of that funnel. Five or six or more feet down the chimney does this little bird begin to form her nest about the middle of May, which consists, like that of the house-martin, of a crust or shell composed of dirt or mud, mixed with short pieces of straw to render it tough and permanent; with this difference, that, whereas the shell of the martin is nearly hemispheric, that of the swallow is open at the top, and like half a deep dish: this nest is lined with fine grasses, and feathers which are often collected as they float in the air. Wonderful is the address (Mr. White observes) which this adroit bird shows all day long in ascending and descending with security through so narrow a pass. When hovering over the mouth of the funnel, the vibrations of her wings acting on the confined air occasion a rumbling like thunder. It is not improbable that the dam submits to this inconvenient situation, so low in the shaft, in order to secure her brood from rapacious birds, and particularly from owls, which frequently fall down chimneys, perhaps in attempting to get at these nestlings.

This bird lays from four to six white eggs, dotted with red specks; and brings out her first brood about the last week in June, or the first week in July. The progressive method by which the young are introduced into life is very curious: First, they emerge from the shaft with difficulty enough, and often fall down into the rooms below: for a day or so they are fed on the chimney-top, and then are conducted to the dead leafless bough of some tree, where, sitting in a row, they are attended with great assiduity, and may then be called *perchers*. In a day or two more they become flyers, but are still unable to take their own food: therefore they play about near the place where the dams are hawking for flies; and, when a mouthful is collected, at a certain signal given, the dam and the nestling advance, rising towards each other, and meeting at an angle; the young one all the while uttering such a little quick note of gratitude and complacency, that a person must have paid very little regard to the wonders of Nature that has not often remarked this feat. The dam betakes herself immediately to the business of a second brood as soon as she is disengaged from her first; which she at once associates with the first broods of house-martins; and with them congregates, clustering on sunny roofs, towers, and trees. This hirundo brings out her second brood towards the middle and end of August. All the summer long is the swallow a most instructive pattern of unwearied industry and affection; for from morning to night, while there is a family to be supported, she spends the whole day in skimming close to the ground, and exerting the most sudden turns and quick evolutions. Avenues, and long walks under hedges, and pasture-fields, and mown meadows where cattle graze, are her delight, especially if there are trees interspersed; because in such spots insects most abound. When a fly is taken, a smart snap from her bill is heard, resembling the noise at the shutting of a watch case; but the motion of the mandibles is too quick for the eye.

The swallow, probably the male bird, is the excubitor to house-martins and other little birds, announcing the approach of birds of prey. For as soon as an hawk appears, with a

still alarming note he calls all the swallows and martins about him; who pursue in a body, and buffet and strike their enemy till they have driven him from the village, darting down from above on his back, and rising in a perpendicular line in perfect security. This bird also will sound the alarm, and strike at cats when they climb on the roofs of houses or otherwise approach the nests. Each species of hirundo drinks as it flies along, sipping the surface of the water; but the swallow alone, in general, washes on the wing, by dropping into a pool for many times together: in very hot weather house-martins and bank-martins dip and wash a little. The swallow is a delicate songster, and in soft sunny weather sings both perching and flying; on trees in a kind of concert, and on chimney tops: it is also a bold flyer, ranging to distant towns and commons even in windy weather, which the other species seem much to dislike; nay, even frequenting exposed sea-port towns, and making little excursions over the salt-water. Horsemen on wide downs are often closely attended by a little party of swallows for miles together, which plays before and behind them, sweeping around, and collecting all the sculking insects that are roused by the trampling of the horses' feet: when the wind blows hard, without this expedient, they are often forced to fettle to pick up their lurking prey.

This species feeds much on little coleoptera, as well as on gnats and flies; and often fettles on dug ground, or paths, for gravel to grind and digest its food. Mr. White informs us, that before they depart, for some weeks, to a bird, they forsake houses and chimneys, and roost in trees; and usually withdraw about the beginning of October; though some few stragglers may be seen at times till the first week in November. Mr. Pennant says, that, for a few days previous to their departure, they assemble in vast flocks on house-tops, churches, and trees, from whence they take their flight. See the articles MIGRATION and SWALLOW. They are supposed to take up their winter-quarters in Senegal and parts adjacent; and seem to possess in turn the whole of the old continent, being known from Norway to the Cape of Good Hope on the one hand, and from Kanttschatka to India and Japan on the other. They are also found in all parts of North America, migrating north and south, as with us. Kalm says, that in America they build in houses and under the outsidings of the roofs; also on the mountains, in such parts of them as project beyond the bottom, as well as under the corners of perpendicular rocks.

2. The *tabitica*, or Otaheite swallow, is five inches in length; its body is of a brown-black colour with a shining blueish gloss, the breast of a fulvous purple, the abdomen of a sooty brown; the bill, tail, and legs are black. It inhabits the mountainous parts of Otaheite. See fig. 1. in the plate.

3. The *esculenta*, or edible swallow, according to Buffon, is less than the wren, and only two inches and a quarter in length. The bill is black; the upper parts of the body are brown, the under whitish; the tail is forked, and each feather of it tipped with white: the legs are brown. See fig. 2.

Mr. Latham thinks, that the size as above described is by much too small, as Mr. Marsden says that the bird "appears to be the common martin;"—and (says Mr. Latham) we are much inclined to think that it is at least of that size, from the eggs which accompany the nest now in the British Museum, which are as big as those of the martin, and of the same colour. However, we cannot dispute the point." The most curious part of the natural history of this bird consists in the nest, which is composed of such materials as render it not only edible, but one of the greatest dainties of the Asiatic epicures.

These nests (see the article BIRDS-Nests) are found in vast numbers in certain caverns, in various isles in the Soolo Archipelago.

pelago, situated between longitude 117 and 120, latitude 5 and 7; particularly in three small isles, or rather rocks; in the caverns of which the nests are found fixed to the sides in astonishing numbers. They are also found in amazing quantities on a small island called *Toc*, in the straits of Sunda; the caverns of which are lined with the nests: but nowhere in greater abundance than about Croee, near the south end of Sumatra, four miles up a river of that name. But they are not peculiar to the above places: for they are likewise common from Java to Cochinchina on the north, and from the point of Sumatra west, to New Guinea on the east; where the sea is said to be covered with a viscous substance like half-melted glue, which the bird is supposed either to take up from the surface with its bill during flight, or to pick it from the rocks when left there by the waves. Of these nests, it is said, the Dutch alone export from Batavia 1000 pickles, upwards of 1300lb. English weight, every year, which are brought from the isles of Cochinchina, and those lying to the east of them. It is much to be wondered, that, among other luxuries imported by us from the east, the use of these nests should not have found a way to our tables; as being yet so scarce in England as to be kept as rarities in the cabinets of collectors. The bird itself at Sumatra is known by the name of Layonglayong.

4. The *borbonica*, or wheat-swallow, is about the size of the swift: the plumage above is blackish-brown; beneath grey, marked with longitudinal brown spots: the tail is even at the end: the bill and legs are black. This species inhabits the Isle of France; frequenting places sown with wheat, and glades of woods; affecting elevated situations, and frequently seen perched on trees and stones. It follows herds of cattle for the sake of the flies which surround them; and is frequently seen in the wake of ships in great numbers, in the road near the isle, no doubt for the same purpose. It is often observed of evenings about the clefts in the mountains, where it is said to pass the night; and where it makes its nest, which is composed of straw and feathers. It lays two eggs, of a grey colour dotted with brown.

5. The *francica*, or grey-rumped swallow, is in length four inches and a quarter; having the upper parts of the body blackish, the rump and under parts whitish or grey. This species also inhabits the Isle of France, but not in great numbers; and is found chiefly in the neighbourhood of fresh waters. It flies swift; and is seldom observed to perch. It is supposed to rest in the woods at night, being seen about the skirts of them towards evening. It is generally very lean, and not good food.

6. The *urbica*, or martin, is inferior in size to the chimney-swallow, and its tail much less forked. The head and upper part of the body, except the rump, are black glossed with blue: the breast, belly, and rump, are white: the feet are covered with a short white down. This is the second of the swallow-kind that appears in our country; and of its manners and economy we have the following curious account in the Rev. Mr. White's Natural History of Selborne. "They begin to appear about the 16th of April; and for some time they in general pay no attention to the business of nidification: they play and sport about, either to recruit from the fatigue of their journey, if they do migrate at all; or else that their blood may recover its true tone and texture after it has been so long benumbed by the severities of winter. About the middle of May, if the weather be fine, the martin begins to think in earnest of providing a mansion for its family. The crust or shell of this nest seems to be formed of such dirt or loam as comes most readily to hand, and is tempered and wrought together with little bits of broken straws to render it tough and tenacious. As this bird often builds against a perpendicular

wall without any projecting ledge under, it requires its utmost efforts to get the first foundation firmly fixed, so that it may safely carry the superstructure. On this occasion the bird not only clings with its claws, but partly supports itself by strongly inclining its tail against the wall, making that a fulcrum; and thus steadied, it works and plasters the materials into the face of the brick or stone. But then, that this work may not, while it is soft and green, pull itself down by its own weight, the provident architect has prudence and forbearance enough not to advance her work too fast; but by building only in the morning, and by dedicating the rest of the day to food and amusement, gives it sufficient time to dry and harden. About half an inch seems to be a sufficient layer for a day. Thus careful workmen, when they build mud-walls (informed at first perhaps by this little bird) raise but a moderate layer at a time, and then desist; lest the work should become top-heavy, and so be ruined by its own weight. By this method in about 10 or 12 days is formed an hemispheric nest, with a small aperture towards the top, strong, compact, and warm; and perfectly fitted for all the purposes for which it was intended. But then nothing is more common than for the house-sparrow, as soon as the shell is finished, to seize on it as its own, to eject the owner, and to line it after its own manner. After so much labour is bestowed in erecting a mansion, as nature seldom works in vain, martins will breed on for several years together in the same nest, where it happens to be well sheltered and secure from the injuries of the weather. The shell or crust of the nest is a sort of rustic-work, full of knobs and protuberances on the outside: nor is the inside of those that I have examined smoothed with any exactness at all; but is rendered soft and warm, and fit for incubation, by a lining of small straws, grasses, and feathers; and sometimes by a bed of moss interwoven with wool. In this nest they tread or engender, frequently during the time of building; and the hen lays from three to five white eggs. At first, when the young are hatched, and are in a naked and helpless condition, the parent birds, with tender assiduity, carry out what comes away from their young. Were it not for this affectionate cleanliness, the nestlings would soon be burnt up and destroyed in so deep and hollow a nest by their own caustic excrement. In the quadruped creation the same neat precaution is made use of, particularly among dogs and cats, where the dams lick away what proceeds from their young. But in birds there seems to be a particular provision, that the dung of nestlings is enveloped in a tough kind of jelly, and therefore is the easier conveyed off without soiling or daubing. Yet, as nature is cleanly in all her ways, the young perform this office for themselves in a little time, by thrusting their tails out at the aperture of their nest. As the young of small birds presently arrive at their *ῥωμια*, or full growth, they soon become impatient of confinement, and sit all day with their heads out at the orifice, where the dams, by clinging to the nest, supply them with food from morning to night. For a time the young are fed on the wing by their parents; but the feat is done by so quick and almost imperceptible a flight, that a person must have attended very exactly to their motions, before he would be able to perceive it. As soon as the young are able to shift for themselves, the dams immediately turn their thoughts to the business of a second brood: while the first flight, shaken off and rejected by their nurses, congregate in great flocks, and are the birds that are seen clustering and hovering on sunny mornings and evenings round towers and steeples, and on the roofs of churches and houses. These congregations usually begin to take place about the first week in August; and therefore we may conclude that by that time the first flight is pretty well over. The young of this species do not quit their abodes all together; but the more forward birds get abroad some days before the

rest. These approaching the eaves of buildings, and playing about before them, make people think that several old ones attend one nest. They are often capricious in fixing on a nesting-place, beginning many edifices, and leaving them unfinished; but when once a nest is completed in a sheltered place, it serves for several seasons. Those which breed in a ready-finished house, get the start in hatching of those that build new by 10 days or a fortnight. These industrious artificers are at their labours in the long days before four in the morning: when they fix their materials, they plaster them on with their chins, moving their heads with a quick vibratory motion. They dip and wash as they fly sometimes in very hot weather, but not so frequently as swallows. Martins love to frequent towns, especially if there are great lakes and rivers at hand. They are by far the least agile of the British hirundines: their wings and tails are short, and therefore they are not capable of such surprising turns, and quick and glancing evolutions as the swallow. Accordingly, they make use of a placid easy motion, in a middle region of the air, seldom mounting to any great height, and never sweeping long together over the surface of the ground or water. They do not wander far for food; but affect sheltered districts, over some lake, or under some hanging wood, or in some hollow vale, especially in windy weather. They breed the latest of all the swallow kind; in 1772 they had nestlings on to October the 21st, and are never without unfledged young as late as Michaelmas. As the summer declines, the congregating flocks increase in numbers daily, by the constant accession of the second broods; till at last they swarm in myriads upon myriads round the villages on the Thames, darkening the face of the sky as they frequent the aits of that river, where they roost. They retire, the bulk of them I mean, in vast flocks together about the beginning of October: but have appeared of late years in a considerable flight in this neighbourhood, for one day or two, as late as November the 3d and 6th, after they were supposed to have been gone for more than a fortnight. They therefore withdraw with us the latest of any species. Unless these birds are very short-lived indeed, or unless they do not return to the district where they are bred, they must undergo vast devastations some how, and some where; for the birds that return yearly bear no manner of proportion to the birds that retire."

7. The *rissa*, or rufous-bellied swallow, is of the same size with the former; and has the upper parts of the body of a glossy black; the under rufous, growing paler towards the vent: the forehead is whitish; and the bill and legs are dusky. These are found at Cayenne, and not unfrequently as far north as New-York. They build in houses, without any mixture of mud; fabricating the nest with moss, dried plants, and short bits of sticks, all united with a sort of gum, so as scarce to be broken, and lined with feathers, suspending it from the beams and rafters, sides of walls, and eaves of houses. It is sometimes a foot and a half in length; and is fixed by one of its sides, the opening being made near the bottom. The female lays four or five eggs; and the young go out as soon as their wings will support them.

8. The *riparia*, sand-martin, or shore-bird, is $4\frac{3}{4}$ th inches in length, with the whole upper parts of the body of a mouse-colour, the throat and under parts white, the bill and legs blackish. It is common about the banks of rivers and sand-pits, where it terebrates a round and regular hole in the sand or earth, which is serpentine, horizontal, and about two feet deep. At the inner end of this burrow does the bird deposit, in a good degree of safety, her rude nest, consisting of fine grasses and feathers, usually goose-feathers, very inartificially laid together. "Though at first (says Mr. White) one would be disinclined to believe that this weak bird, with her soft and tender bill and claws, should ever be able to bore the stubborn sand-bank.

without entirely disabling herself; yet with these feeble instruments have I seen a pair of them make great dispatch; and could remark how much they had scooped that day by the fresh sand which ran down the bank, and was of a different colour from that which lay loose and bleached in the sun. In what space of time these little artists are able to mine and finish these cavities, I have never been able to discover; but it would be a matter worthy of observation, where it falls in the way of any naturalist to make his remarks. This I have often taken notice of, that several holes of different depths are left unfinished at the end of summer. To imagine that these beginnings were intentionally made in order to be in the greater forwardness for next spring, is allowing perhaps too much foresight and *rerum prudentia* to a simple bird. May not the cause of these *latebræ* being left unfinished arise from their meeting in those places with strata too harsh, hard, and solid, for their purpose, which they relinquish, and go to a fresh spot that works more freely? Or may they not in other places fall in with a soil as much too loose and mouldering, liable to flounder, and threatening to overwhelm them and their labours? One thing is remarkable—that, after some years, the old holes are forsaken and new ones bored; perhaps because the old habitations grow foul and fetid from long use, or because they may so abound with fleas as to become untenable. This species of swallow moreover is strangely annoyed with fleas: and we have seen fleas, bed fleas (*pulex irritans*), swarming at the mouths of these holes, like bees on the floos of their hives.

The sand-martin arrives much about the same time with the swallow; and lays, as she does, from four to six white eggs. But as this species is *cryptegane*, carrying on the business of nidification, incubation, and the support of its young in the dark, it would not be easy to ascertain the time of breeding, were it not for the coming forth of the broods, which appear much about the time, or rather somewhat earlier than those of the swallow. The nestlings are supported in common, like those of their congeners, with gnats and other small insects; and sometimes they are fed with *libellulæ* (dragon flies) almost as long as themselves. This *hirundo* is said to lay only once in a year, and to produce its young more early than the rest of its tribe: though from this last circumstance it would seem probable that they breed at least a second time, like the house-martin and swallow. It does not always take pains to make an hole for a nest; frequently laying in cavities of quarries, and in hollows of trees, where it is convenient. When they happen to breed near hedges and inclosures, they are often dispossessed of their breeding-holes by the house-sparrow, which is on the same account a fell adversary to house-martins. These *hirundines* are no songsters, but rather mute, making only a little harsh noise when a person approaches their nests. They seem not to be of a sociable turn, never with us congregating with their congeners in the autumn. They have a peculiar manner of flying; flitting about with odd jerks and vacillations, not unlike the motions of a butterfly. Doubtless the flight of all *hirundines* is influenced by and adapted to the peculiar sort of insects which furnish their food. Hence (says Mr. White) it would be worth inquiry to examine what particular genus of insects affords the principal food of each respective species of swallow.

9. The *montana*, or crag-swallow, is about the size of the martin, and in its upper plumage like the sand-martin: the under part of the body is rufous; the tail is scarcely forked; the legs are covered with grey down mixed with brown; the bill and the claws are black. These birds inhabit the rocks and crags about Savoy; arriving there the middle of April, and departing the 15th of August, for the most part; now and then some stragglers remain to the 10th of October.

This species is also found in the mountains of Auvergne and Dauphiné; and specimens have been received from Gibraltar.

10. The *purpurea*, or purple swallow, is in length seven inches, and the whole body is of a deep violet, very glossy: the quills and tail are of the same colour, but still deeper, and the last forked: the legs and claws are blackish; and the bill is black. The colour of the female is dusky brown, with a slight tinge of violet. This species is found in summer in Carolina and Virginia; coming in May, and retiring at the approach of winter. The common people are very fond of them; and make little conveniences of boards on the outsides of their houses for the birds to build in, like as is done for sparrows in England; being desirous to keep them near, as they are of much use in alarming the poultry of the approach of the hawk and other birds of prey; not only shrieking violently on the appearance of these enemies, but attacking them with all the efforts of our martins in Europe. See fig. 4.

11. The *apus*, or swift, is a large species, being near eight inches long, with an extent of wing near eighteen inches, though the weight of the bird is only one ounce. Their feet are so small, that the action of walking and rising from the ground is extremely difficult; so that nature has made it full amends, by furnishing it with ample means for an easy and continual flight. It is more on the wing than any other swallow; its flight is more rapid, and that attended with a shrill scream. It rests by clinging against some wall, or other apt body; from whence Klein styles this species *hirundo muraria*. It breeds under the eaves of houses, in steeples, and other lofty buildings; and makes its nest of grasses and feathers. The feet of this species are of a particular structure, all the toes standing forward: the least consists of only one bone; the others of an equal number, viz. two each; in which they differ from those of all other birds: a construction, however, nicely adapted to the purposes in which their feet are employed.

The swift is a summer inhabitant of these kingdoms. It comes the latest, and departs the soonest, of any of the tribe; not always staying to the middle of August, and often not arriving before the beginning of May. A pair of these birds were found adhering by their claws, and in a torpid state, in Feb. 1766, under the roof of Longnor-chapel, in Shropshire; on being brought to a fire, they revived, and moved about the room.

The fabulous history of the *manucodiata*, or bird of paradise (says Mr. Pennant), is, in the history of this species, in a great measure verified. It was believed to have no feet; to live upon the celestial dew; to float perpetually on the atmosphere; and to perform all its functions in that element. The swift actually performs what has been in these enlightened times disproved of the former, except the small time it takes in sleeping, and what it devotes to incubation; every other action is done on wing. The materials of its nest it collects either as they are carried about by the winds, or picks them up from the surface in its sweeping flight. Its food is undeniably the insects that fill the air. Its drink is taken in transient sips from the water's surface. Even its amorous rites are performed on high. Few persons who have attended to them in a fine summer's morning, but must have seen them make their aerial courses at a great height, encircling a certain space with an easy steady motion. On a sudden they fall into each others embraces, then drop precipitate with a loud shriek for numbers of yards. This is the critical conjuncture; and to be no more wondered at, than that insects (a familiar instance) should discharge the same duty in the same element.

The swift is a most alert bird, rising very early, and retiring

to roost very late; and is on the wing in the height of summer at least sixteen hours. In the longest days it does not withdraw to rest till a quarter before nine in the evening, being the latest of all day birds. Just before they retire, whole groups of them assemble high in the air, and squeak, and shoot about with wonderful rapidity. But this bird is never so much alive as in sultry thundery weather, when it expresses great alacrity, and calls forth all its powers. In hot mornings several, getting together in little parties, dash round the steeples and churches, squeaking as they go in a very clamorous manner: these, by nice observers, are supposed to be males serenading their sitting hens; and not without reason, since they seldom squeak till they come close to the walls or eaves, and since those within utter at the same time a little inward note of complacency. When the hen has sitten hard all day, she rushes forth just as it is almost dark, and stretches and relieves her weary limbs, and snatches a scanty meal for a few minutes, and then returns to her duty of incubation. Swifts, when wantonly and cruelly shot while they have young, discover a little lump of insects in their mouths, which they pouch and hold under their tongue. In general, as already observed, they feed in a much higher district than the other species; they also range to vast distances; since locomotion is no labour to them, who are endowed with such wonderful powers of wing. At some certain times in the summer, however, they have been observed hawking very low for hours together over pools and streams; and upon inquiring into the object of their pursuit that induced them to descend so much below their usual range, it has been found that they were taking *phryganæ*, *ephemeræ*, and *libellulæ* (cadew-flies, may-flies, and dragon-flies), that were just emerged out of their aurelia state. It appeared then no longer a wonder that they should be so willing to stoop for a prey that afforded them such plentiful and succulent nourishment. Swifts sometimes pursue and strike at hawks that come in their way; but not with that vehemence and fury that swallows express on the same occasion. They are out all day long in wet days, feeding about and disregarding still rain: from whence two things may be gathered; first, that many insects abide high in the air, even in rain; and next, that the feathers of these birds must be well preened to resist so much wet. Windy weather, and particularly with heavy showers, they dislike; and on such days withdraw, and are scarcely ever seen. There is a circumstance respecting the colour of swifts (Mr. White remarks), which seems not to be unworthy our attention. When they arrive in the spring, they are all over of a glossy dark foot-colour, except their chins, which are white; but, by being all day long in the sun and air, they become quite weather-beaten and bleached before they depart, and yet they return glossy again in the spring. Now, if they pursue the sun into lower latitudes, as some suppose, in order to enjoy a perpetual summer, why do they not return bleached? Do they not rather perhaps retire to rest for a season, and at that juncture moult and change their feathers, since all other birds are known to moult soon after the season of breeding?

“Swifts (continues our author) are very anomalous in many particulars, dissenting from all their congeners not only in the number of their young, but in breeding once in a summer; whereas all the other British hirundines breed invariably twice. It is past all doubt that swifts can breed but once, since they withdraw in a short time after the flight of their young, and some time before their congeners bring out their second broods. We may here remark, that, as swifts breed but once in a summer, and only two at a time, and the other hirundines twice, the latter, who lay from four to six eggs, increase at an average five times as fast as the former. But in nothing are swifts more singular than in their early retreat. They retire, as to the main body of them, by the tenth of August, and

sometimes a few days sooner: and every straggler invariably withdraws by the twentieth, while their congeners, all of them, stay till the beginning of October; many through all that month, and some occasionally to the beginning of November. This early retreat is mysterious and wonderful, since that time is often the sweetest season in the year. But, what is more extraordinary, they begin to retire still earlier in the most southerly parts of Andalusia, where they can be no ways influenced by any defect of heat; or, as one might suppose, defect of food. Are they regulated in their motions with us by a failure of food, or by a propensity to moulting, or by a disposition to rest after so rapid a life, or by what? This is one of those incidents in natural history that not only baffles our searches, but almost eludes our guesses!”

Swifts never perch on trees or roofs, and so never congregate with their congeners. They are fearless while haunting their nesting-places, and are not to be scared with a gun; and are often beaten down with poles and cudgels as they stoop to go under the eaves. Mr. White informs us, that having untiled part of a roof over the nest of a swift, the dam notwithstanding sat in the nest: so strongly was she affected by natural *στολὴ* for her brood, which she supposed to be in danger, that, regardless of her own safety, she would not stir, but lay fullenly by them, permitting herself to be taken in hand. Swifts are much infested with those pests to the genus called *hippoboscæ hirundinis*; and often wriggle and scratch themselves, in their flight, to get rid of that clinging annoyance. And young ones, over-run with these insects, are sometimes found under their nests, fallen to the ground; the number of vermin rendering their abode insupportable.

Swifts are no songsters, and have only one harsh screaming note; yet there are ears to which it is not displeasing, from an agreeable association of ideas, since that note never occurs but in the most lovely summer weather. They never settle on the ground but through accident; neither can they walk, but only crawl; but they have a strong grasp with their feet, by which they cling to walls, as already noticed. Their bodies being flat, they can enter a very narrow crevice; and where they cannot pass on their bellies, they will turn up edgewise. In London a party of swifts frequents the Tower, playing and feeding over the river just below the bridge: others haunt some of the churches of the Borough next the fields; but do not venture, like the house-martin, into the close crowded part of the town. The Swedes have bestowed a very pertinent name on this swallow, calling it *ring-swala*, from the perpetual rings or circles that it takes round the scene of its nidification. As these birds are apt to catch at every thing on the wing, many have taken them by a bait of a cockchafer tied to a thread, which they have swallowed as freely as a fish theirs. In the Isle of Zant, the boys are said to get on an elevated place, and merely with a hook baited with a feather, have caught five or six dozen of them in a day. Besides our island, the swift is known to inhabit the whole of the European continent; and has also been noticed at the Cape of Good Hope, and Carolina in North America. Hence, most likely, a general inhabitant of both the old and new continent.

12. The *ambrosiaca*, or ambergris swallow, is about the size of a wren, with a grey plumage and a very forked tail; the bill is blackish, and the legs are brown. It inhabits Senegal, and is said to smell very strong of ambergris.

13. The *pelasgia*, or aculeated swallow, is somewhat less than our chimney-swallow: its plumage is brown, but at the throat whitish, and all the tail-feathers are terminated by a bare pointed shaft. It inhabits Carolina and Virginia in the summer time, and builds in dry situations in the chimneys of houses and cottages.

14. The *melba*, or white-bellied swift, is in length $8\frac{1}{2}$ inches,

and weighs two ounces five drams; the bill is half an inch, somewhat bent, and black: the upper parts of the body are of a grey brown; the wings and tail deepest, with a gloss of red and green in some lights: the throat, breast, and belly, are white; on the neck is a collar of grey brown, mixed with black: the sides are dusky, and white mixed; lower part of the belly, and under tail-coverts, the same as the back: the legs are flesh-coloured, and covered with feathers on the fore-part and inside: all the toes are placed forward, as in our swift. This bird inhabits the mountainous parts of Spain; building in the holes of rocks. It is found also on the borders of the Rhone, in Savoy, the isle of Malta, Alps of Switzerland, and rock of Gibraltar. It comes into Savoy the beginning of April, and frequents the ponds and marshes for 15 or 20 days; after which it retires to the mountainous parts to breed. It flies higher than our swift; but feeds on the same food, and its flesh is accounted a delicate morsel. This species is not numerous. Scopoli says it builds on the summit of the mountains of Tyrol.

15. The *cayennensis*, or white-coloured swallow, is about the size of the martin: the head and bill are black; the chin and throat white, passing from the last in a narrow collar round the neck: between the bill and eye is a streak of white, which forks off into two; one passing a little above and the other a little way beneath the eye: the rest of the plumage is black, with a gloss of violet; but the greater coverts, nearest the body, are brown, edged with white: the quills and tail are black; the last forked: the legs are black; and all the four toes placed before as in our swift, and covered with feathers to the claws. This bird makes its nest in the houses at Cayenne. It is of a large size, in shape of a truncated cone; five inches one way by three the other, and nine inches in length. It is composed of the down of dog's-bane, well woven together; the cavity divided obliquely about the middle, lengthways, by a partition, which spreads itself over that part of the nest where the eggs lie, which is pretty near the base: a small parcel of the same soft down, forming a kind of plug, is placed over the top, serving to keep the young brood from the impression of the air; from which we may suppose them to be very tender.

16. The *erythrocephala*, or red-headed swallow, has a red head, with a short flat dusky bill: the back is dusky, the feathers edged with white: the under parts of the body are white, the tail-coverts pale brown: the wings are both dusky; as is also the tail, which is a little forked. It inhabits India; and is only the size of a small humming-bird.

17. The *nigra*, or black swallow, measures near six inches in length: the colour of the bird is wholly black, and the tail is forked. It inhabits St. Domingo and Cayenne; but is not numerous. It is often seen to perch on dead trees; and only inhabits dry savannas inland. It scoops out a hole in the earth, half a foot in length, with the mouth very small, so as just to permit entrance: in this cavity it constructs the nest and rears its young.

18. The *dominicensis*, or St. Domingo swallow, is 7 inches in length, and wholly black, with the gloss of polished steel, except the belly and under tail coverts, which are white: the tail is very little forked: the legs, bill, and claws are brown. It inhabits St. Domingo, and other of the West India islands, in May, June, and July; and is said to imitate a lark in its song. See fig. 3.

To this article we may not improperly subjoin the following paper (from the Gentleman's Magazine) on the utility of encouraging the breed of swallows, swifts, and martins. "The advantages that accrue to man, from the docility with which the domesticated animals accommodate themselves to his uses, are obvious. But there are others, who attend on him of their

own accord, whose beneficial exertions are little known or observed. Among these I shall at present only notice the family of swallows (*hirundines*); of the four kinds of which bird found in our island three attach themselves to his dwelling, as if peculiarly solicitous for his welfare. This connection seems so reciprocal, that where men do not inhabit, few swallows can find proper conveniences for their summer-residence; and as their food consists wholly of insects, the most diligent inquirer hath not been able to discover that they injure in the slightest degree the productions of the field or garden; a circumstance nearly peculiar to these birds. The charge which Virgil, copying the Grecian writers, brings against them, of killing bees, is in this country groundless, and I apprehend it to be so in every other:

" Absint——

——Meropesque aliæque volucres,
Et manibus Procne pectus signata cruentis;
Omnia nam late vastant, ipsæque volantes
Ore ferunt, dulcem nidis immitibus escam."

Georg. l. 4. v. 23.

For the mouths of the swallow tribe are by no means adapted to catch stinging insects with impunity. The birds who prey on bees have a long extended bill constructed for that purpose, very different from that of the swallow.

" By the myriads of insects which every single brood of swallows destroys in the course of a summer, they defend us in a great measure from the personal and domestic annoyance of flies and gnats; and, what is of infinitely more consequence, they keep down the numbers of our minute enemies, who, either in the grab or winged state, would otherwise render the labours of the husbandman fruitless. Since then swallows are guardians of our corn, they should every where be protected by the same popular veneration which in Egypt defends the Ibis and the stork in Holland. We more frequently hear of unproductive harvests on the Continent than in this country; and it is well known that swallows are caught and sold as food in the markets of Spain, France, and Italy. When this practice has been very general and successful, I have little doubt that it hath at times contributed to the scarcity of corn. In England we are not driven to such resources to furnish our tables. But what apology can be made for those, and many there are, whose education and rank should have taught them more innocent amusements, who wantonly murder swallows, under the idle pretence of improving their skill in shooting game? Setting aside the cruelty of starving whole nests of young by killing the dam; they who follow this barbarous diversion would do well to reflect, that by every swallow they kill, they assist blasts, mildews, and vermin, in causing a scarcity of bread. Every lord of a manor should restrain his game-keeper from this execrable practice; nor should he permit any person to sport on his lands who does not refrain from it. For my part, I am not ashamed to own that I have tempted martins to build around my house, by fixing escallop shells, in places convenient for their pendent beds and procereant cradles; and have been pleased to observe with what caution the little architect raised a buttress under each shell before he ventured to form his nest on it.

" What has induced me to send you these strictures at this time, are the accounts of the ravages committed on the cultivation of corn in the United States of North America, by an insect called the *Hessian-Fly*. (See the article *HESSIAN-Fly*.) How far there is danger of this desolating scourge being imported into this country by the admission of American wheat, I must leave to abler entomologists to decide. But that this destructive insect should, as hath lately been asserted, totally disappear in one season, after having for a number of years

ſucceſſively laid waſte wide extended diſtricts, is a phenomenon hardly to be alſented to by thoſe who have turned their minds to inquiries of this ſort.

“ Might I not here enlarge on the importance of reſearches into the works of the creation, when we ſee ſtateſmen, as in the preſent inſtance, making ſolemn applications to thoſe who are ſtudioſ of nature, requeſting their direſtion how to avoid the calamity apprehended from a fly? And may we not then add, that the minuteſt obſervations of this kind are only deemed trivial by the indolent and uninformed? ”

“ I recolleſt but a ſingle complaint againſt the ſwallow, and that is made by Anacreon, Od. 12. who bitterly reproaches this bird for diſturbſng him by its twittering while he was dozing away the intoxication of the preceding night. Yet, had the poet been temperate, like Milton, he would with pleaſure have ariſen from his bed at the charm of earlieſt birds.

“ With what joy the Grecians welcomed the return of the ſwallow, appears by the very ancient carol preſerved by Aſthe-
naus; of which the following is a tranſlation:—

The ſwallow! the ſwallow! ſhe does with her bring
Soft ſeaſons and all the delights of the ſpring:
The ſwallow! the ſwallow! we're ſure we are right,
For her back is all black, and her belly all white.
From your ſtores, ye good houſewives, produce, if you pleaſe,
Lumps of figs, jugs of wine, and ſome wheat and ſome cheeſe.
With ſome hen eggs the ſwallow will well be content.
Muſt we go then, or ſhall we have any thing ſent?

We will not allow you to do as you chooſe,
To give or give not, to comply or reſuſe;
But will certainly take from its hinges the door,
Or bear off the good dame as ſhe ſits on the floor;
She is little and light, we can manage her ſure. }
Open, open the door to the ſwallow—for we
Are playful young children, not men—you may ſee.

HISPA, in zoology; a genus of inſects belonging to the coleoptera order, the characters of which are theſe: The antennæ are fuſiform, growing gradually larger from each extremity towards the middle; and are ſituated between the eyes: the thorax and elytra are covered with protuberances or ſpines. The larva of this inſect ſeems to be yet wholly unknown. There are but two ſpecies of the perfect animal met with in Europe; one of which, the atra, is found in Britain, and is all over of a deep unpoliſhed black, and has the upper part of its body entirely covered with long and ſtrong ſpines, which render it britily like the ſhell of a cheſnut. There is even a ſpine at the caſe of the antennæ; the thorax has a row ſet tranſverſely, which are forked; and the elytra are furniſhed with a very great number that are ſingle. Its being thus covered with ſpines, makes it reſemble a hedge hog in miniature. It is rather hard to catch, letting itſelf fall down on the ground as ſoon as approached. It bears its antennæ upright before it. See Pl. 10.

HISPALIS, in ancient geography, a town of Bætica, in the Farther Spain; an ancient mart or trading town on the Bætis, navigable quite up to it for ſhips of burthen, and thence to Corduba for river barges. Called *Colonia Romulentiſis*. It has alſo a conventus juridicus, a court of juſtice or aſſizes, (Pliny). Now called *Seville*. W. lon. 6°. N. lat. 37°.

HISPANIA, in ancient geography, called *Hesperia Ultima*, (Horace), becauſe the weſtmoſt part of Europe; alſo *Iberia*, from the river Iherus. Its name *Hiſpania*, or *Spania*, (Greek), is of Phœnician original, from its great number of rabbits: the Phœnicians, who ſettled ſeveral colonies on the coaſt, calling it *Spanjah*, from theſe animals. It has the ſea on every ſide, except on that next to Gaul, from which it is ſeparated by the Pyrenées. The Romans at firſt divided it into the Farther and Hither Spain, under two prætors. In that ſtate it continued down

to Auguſtus; who divided the Farther Spain into Bætica, which he left to the people to be governed by a pro-conſul; and into Luſitania, which he added to his own provinces; calling the Hither Spain *Tarraconenſis*. Hiſpania was a country celebrated for its fertility, of which it has greatly fallen ſhort in modern times. The people were of a warlike turn, (Strabo); and their bodies being formed for hardſhips and labour, they ever preferred war to peace, and were remarkably prodigal of life (Juſtin, Sil. Italicus). Spain produced ſeveral great men, both in a literary and a political capacity. See SPAIN.

HISPANIOLA, called alſo St. DOMINGO, the largeſt of the Antilles or Caribbee iſlands, extending about 420 miles from eaſt to weſt, and 120 in breadth from north to ſouth; lying between 17° 37' and 20° of N. lat. and between 67° 35' and 74° 15' W. lon. The climate is hot, but not reckoned unwholeſome; and ſome of the inhabitants are ſaid to arrive at the age of 120. It is ſometimes reſreſhed by breezes and rains; and its ſalubrity is likewise in a great meaſure owing to the beautiful variety of hills and valleys, woods and rivers, which every where preſent themſelves. It is indeed reckoned by far the fineſt and moſt pleaſant iſland of the Antilles, as being the beſt accommodated to all the purpoſes of life when duly cultivated.

This iſland, famous for being the earlieſt ſettlement of the Spaniards in the new world, was at firſt in high eſtimation for the quantity of gold it ſupplied: this wealth diminiſhed with the inhabitants of the country, whom they obliged to dig it out of the bowels of the earth; and the ſource of it was entirely dried up, when they were exterminated, which was quickly done, by a ſeries of the moſt ſhocking barbarities that ever diſgraced the hiſtory of any nation. Benzoni relates, that of two millions of inhabitants, contained in the iſland when diſcovered by Columbus in 1492, ſcarce 153 were alive in 1545. A vehement deſire of opening again this ſource of wealth inſpired the thought of getting ſlaves from Africa; but, beſides that theſe were found unfit for the labours they were deſtined to, the multitude of mines, which then began to be wrought on the continent, made thoſe of Hiſpaniola no longer of any importance. An idea now ſuggeſted itſelf, that their negroes, which were healthy, ſtrong, and patient, might be uſefully employed in huſbandry; and they adopted, through neceſſity, a wiſe reſolution, which, had they known their own intereſt, they would have embraced by choice.

The produce of their induſtry was at firſt extremely ſmall, becauſe the labourers were few. Charles V. who, like moſt ſovereigns, preferred his favourites to every thing, had granted an excluſive right of the ſlave-trade to a Flemiſh nobleman, who made over his privilege to the Genoefe. Thoſe avaricious republicans conducted this infamous commerce as all monopolies are conducted; they reſolved to ſell dear, and they ſold but few. When time and competition had fixed the natural and neceſſary price of ſlaves, the number of them increaſed. It may eaſily be imagined, that the Spaniards, who had been accuſtomed to treat the Indians as beaſts, did not entertain a higher opinion of theſe negro Africans, whom they ſubſtituted in their place. Degraded ſtill farther in their eyes by the price they had paid for them, even religion could not reſtrain them from aggravating the weight of their ſervitude. It became intolerable, and theſe wretched ſlaves made an effort to recover the uſual enable rights of mankind. Their attempt proved unſucceſſful, but they reaped this benefit from their deſpair, that they were afterwards treated with leſs inhumanity.

This moderation (if tyranny cramped by the apprehenſion of revolt can deſerve that name) was attended with good conſequences. Cultivation was purſued with ſome degree of ſucceſs. Soon after the middle of the 16th century, the mother country drew annually from this colony ten millions weight of ſugar,



Hippomane Mancinella.

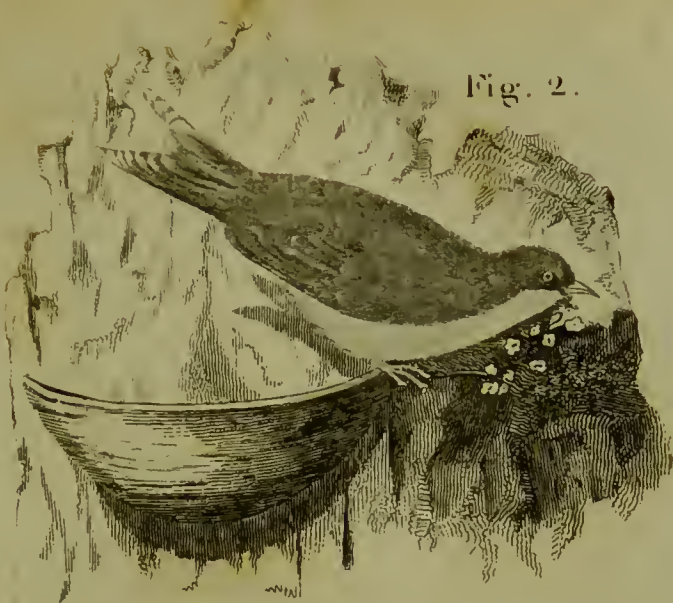


Fig. 2.

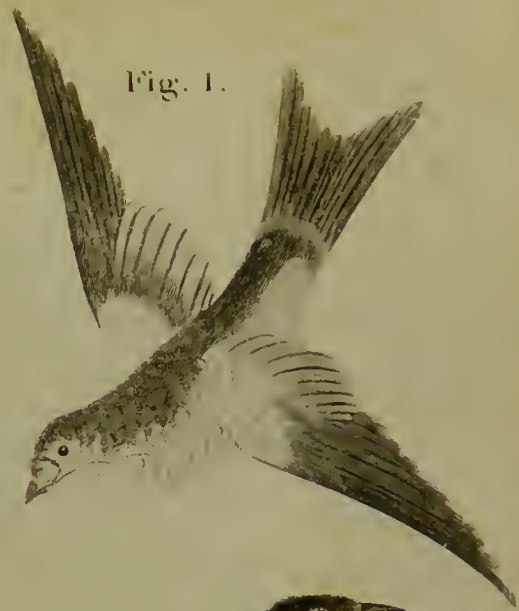


Fig. 1.



Fig. 3.



Hifter.



Holothuria.

Fig. 1.



Fig. 2.

Holeus Sorghum.

Fig. 3.



Hirpida.



large quantity of wood for dyeing; tobacco, cocoa, cassia, ginger, cotton, and peltry in abundance. One might imagine, that such favourable beginnings would give both the desire and the means of carrying them further; but a train of events, more fatal each than the other, ruined these hopes.

The first misfortune arose from the depopulation of the island. The Spanish conquests on the continent should naturally have contributed to promote the success of an island, which nature seemed to have formed to be the centre of that vast dominion arising around it, to be the staple of the different colonies. But it fell out quite otherwise: on a view of the immense fortunes raising in Mexico, and other parts, the richest inhabitants of Hispaniola began to despise their settlements, and quitted the true source of riches, which is on the surface of the earth, to go and ransack the bowels of it for veins of gold, which are quickly exhausted. The government endeavoured in vain to put a stop to this emigration; the laws were always either artfully eluded, or openly violated.

The weakness, which was a necessary consequence of such a conduct, leaving the coasts without defence, encouraged the enemies of Spain to ravage them. Even the capital of this island was taken and pillaged by that celebrated English sailor, Sir Francis Drake. The cruizers of less consequence contented themselves with intercepting vessels in their passage through those latitudes, the best known at that time of any in the new world. To complete these misfortunes, the Castilians themselves commenced pirates. They attacked no ships but those of their own nation; which were more rich, worse provided, and worse defended, than any others. The custom they had of fitting out ships clandestinely, in order to procure slaves, prevented them from being known; and the assistance they purchased from the ships of war, commissioned to protect the trade, insured to them impunity.

The foreign trade of the colony was its only resource in this distress; and that was illicit: but as it continued to be carried on, notwithstanding the vigilance of the governors, or, perhaps, by their connivance, the policy of an exasperated and short-sighted court exerted itself in demolishing most of the sea-ports, and driving the miserable inhabitants into the inland country. This act of violence threw them into a state of dejection; which the incursions and settlement of the French on the island afterwards carried to the utmost pitch. The latter, after having made some unsuccessful attempts to settle on the island, had part of it yielded to them in 1697, and in 1795, the whole was ceded to them by the Spaniards.

Spain, totally taken up with that vast empire which she had formed on the continent, used no pains to dissipate this lethargy. She even refused to listen to the solicitations of her Flemish subjects, who earnestly pressed that they might have permission to clear those fertile lands. Rather than run the risk of seeing them carry on a contraband trade on the coasts, she chose

to bury in oblivion a settlement which had been of consequence, and was likely to become so again.

This colony, which had no longer any intercourse with the mother country but by a single ship, of no great burthen, that arrived from thence every third year, consisted, in 1717, of 18,410 inhabitants, including Spaniards, Mestees, Negroes, or Mulattoes. The complexion and character of these people differed according to the different proportions of American, European, and African blood they had received from that natural and transient union which restores all races and conditions to the same level. These demi-savages, plunged in the extreme of sloth, lived upon fruits and roots, dwelt in cottages without furniture, and most of them without clothes. The few among them, in whom indolence had not totally suppressed the sense of decency and taste for the conveniences of life, purchased clothes of their neighbours the French in return for their cattle, and the money sent to them for the maintenance of two hundred soldiers, the priests, and the government. It does not appear that the company, formed at Barcelona in 1757, with exclusive privileges for the re-establishment of St. Domingo, ever, in fact, made any considerable progress. They sent out only two small vessels annually, which were freighted back with six thousand hides, and some other commodities of little value. See DOMINGO.

HISTER, in zoology; a genus of the coleoptera order of insects. See Plate 10. The first articulation of the antennæ is compressed and curved; the last is considerably larger than the others, and appears to be a solid knob: the head is drawn within the body; the mouth is forcipated: the elytra are shorter than the body; and the fore-legs are dentated. The body of these creatures is polished and very shining, and their form almost square; the thorax large, and highly polished: anteriorly it is made with a slope, in the cavity of which is lodged the head, the position of which is often only discovered by the projection of the maxillæ; for the head, for the most part, is so withdrawn under the thorax, that the insect looks as if it had none. The elytra are as it were cut off towards the extremity, and do not cover the whole of the abdomen. They are extremely smooth, and only have a few striæ, scarce perceptible, situated chiefly towards their outward side. Lastly, the hinder part of the abdomen, which projects beyond the elytra, is round and blunt. These insects are sometimes found in cow-dung, and often on sand. They vary prodigiously in size; but differ very little either in form or colour, they being all very dark. The larvæ, as well as the perfect insects, are frequently met with in the dung of horses, cows, &c.

HISTORIOGRAPHER, a professed historian, or writer of history. See the next article. The historiographer to his majesty is an officer under the lord chamberlain; his salary 200*l. per annum*. There is an office of the same kind in Scotland, with the same salary.

H I S T O R Y.

HISTORY, in general, signifies an account of certain remarkable facts which have happened in the world, arranged in the true order in which they actually took place, together with the causes to which they were owing, and the different effects they produced, as far as could be discovered. The word is Greek, *ἱστορία*; and literally denotes a search for curious things, or a desire of knowing, or even a rehearsal of things we have seen; being formed from the verb *ἵστω*, which properly signifies to know a thing by having seen it. But the

idea is now much more extensive, and is applied to the knowledge of things taken from the report of others. The origin is from the verb *ἵστωμι*, "I know;" and hence it is, that among the ancients, several of their great men were called *polyhistor*, i. e. persons of various and general knowledge.

Sometimes, however, the word history is used to signify a description of things, as well as an account of facts. Thus Theophrastus calls his work, in which he has treated of the nature and properties of plants, an *history of plants*; and we have

a treatise of Aristotle, intitled an *history of animals*; and to this day the description of plants, animals, and minerals, are called by the general name of *natural history*.

But what chiefly merits the name of history, and what is here considered as such, is an account of the principal transactions of mankind since the beginning of the world; and which naturally divides itself into two parts, namely, *civil* and *ecclesiastical*. The first contains the history of mankind in their various relations to one another, and their behaviour, for their own emolument, or that of others, in common life; the second considers them as acting, or pretending to act, in obedience to what they believe to be the will of the Supreme Being. Civil history, therefore, includes an account of all the different states that have existed in the world, and likewise of those men who in different ages of the world have most eminently distinguished themselves either for their good or evil actions. This last part of civil history is usually termed BIOGRAPHY.

History is now considered as a very considerable branch of polite literature: few accomplishments are more valued than an accurate knowledge of the histories of different nations; and scarce any literary production is more regarded than a well-written history of any nation.

With regard to the study of history, we must consider, that all the revolutions which have happened in the world, have been owing to two causes. 1. The connections between the different states existing together in the world at the same time, or their different situations with regard to one another; and, 2. The different characters of the people who in all ages constituted these states, their different geniuses and dispositions, &c. by which they were either prompted to undertake such and such actions of themselves, or were easily induced to it by others. The person who would study history, therefore, ought in the first place to make himself acquainted with the state of the world in general in all different ages; what nations inhabited the different parts of it; what their extent of territory was; at what particular time they arose, and when they declined. He is then to inform himself of the various events which have happened to each particular nation; and, in so doing, he will discover many of the causes of those revolutions, which before he only knew as facts. Thus, for instance, a person may know the Roman history from the time of Romulus, without knowing in the least why the city of Rome happened to be built at that time. This cannot be understood without a particular knowledge of the former state of Italy, and even of Greece and Asia; seeing the origin of the Romans is commonly traced as high as Æneas, one of the heroes of Troy. But when all this is done, which indeed requires no small labour, the historian hath yet to study the genius and dispositions of the different nations, the characters of those who were the principal directors of their actions, whether kings, ministers, generals, or priests; and when this is accomplished, he will discover the causes of those transactions in the different nations which have given rise to the great revolutions above mentioned: after which, he may assume the character of one who is perfectly versed in history.

The first *outline* of history, as it may be called, is most easily obtained by the inspection of an historical chart; and that subjoined to the present treatise will answer the purpose as well as any. See Plate 11. and the explanation at the end of this Treatise. Along with this it will be proper to peruse a short abridgement of general history, from the creation of the world to the present time; but in this way there have been but very few publications attended with any tolerable success. The following is collected from respectable authorities, and may serve to help the ideas of the reader on this subject.

CHAP. I.

Of CIVIL HISTORY.

HISTORY, though seemingly incapable of any natural division, will yet be found, on a nearer inspection, to resolve itself into the following periods, at each of which a great revolution took place, either with regard to the whole world, or a very considerable part of it. 1. The creation of man. 2. The flood. 3. The beginning of profane history, *i. e.* when all the fabulous relations of heroes, demi-gods, &c. were expelled from historical narrations, and men began to relate facts with some regard to truth and credibility. 4. The conquest of Babylon by Cyrus, and the destruction of the Babylonian empire. 5. The reign of Alexander the Great, and the overthrow of the Persian empire. 6. The destruction of Carthage by the Romans, when the latter had no longer any rival capable of opposing their designs. 7. The reign of the emperor Trajan, when the Roman empire was brought to its utmost extent. 8. The division of the empire under Constantine. 9. The destruction of the western empire by the Heruli, and the settlement of the different European nations. 10. The rise of Mahomet, and the conquests of the Saracens and Turks. 11. The crusades, and all the space intervening between that time and the present.

Concerning the number of years which have elapsed since the creation of the world, there have been many disputes. The compilers of the Universal History determine it to have taken place in the year 4305 B. C. so that, according to them, the world is now in the 6096th year of its age. Others think it was created only 4000 years B. C. so that it hath not yet attained its 6000th year. Be this as it will, however, the whole account of the creation rests on the truth of the Mosaic history; and which we must of necessity accept, because we can find no other which does not either abound with the grossest absurdities, or lead us into absolute darkness. The Chinese and Egyptian pretensions to antiquity are so absurd and ridiculous, that the bare reading must be a sufficient confutation of them to every reasonable person. See the articles CHINA and EGYPT. Some historians and philosophers are inclined to discredit the Mosaic accounts, from the appearances of volcanoes, and other natural phenomena: but their objections are by no means sufficient to invalidate the authority of the sacred writings; not to mention that every one of their own systems is liable to insuperable objections. It is therefore reasonable for every person to accept of the Mosaic account of the creation as truth: but an historian is under an absolute necessity of doing it, because, without it, he is quite destitute of any standard or scale by which he might reduce the chronology of different nations to any agreement; and, in short, without receiving this account as true, it would be in a manner impossible at this day to write a general history of the world.

1. The transactions during the first period, *viz.* from the creation to the flood, are very much unknown, nothing indeed being recorded of them but what is to be found in the first six chapters of Genesis. In general, we know, that men were not at that time in a savage state; they had made some progress in the arts, had invented music, and found out the method of working metals. They seem also to have lived in one vast community, without any of those divisions into different nations which have since taken place, and which evidently proceeded from the confusion of languages. The most material part of their history, however, is, that having once begun to transgress the divine commands, they proceeded to greater and greater lengths of wickedness, till at last the Deity thought proper to send a flood on the earth, which destroyed the whole human race except eight persons, *viz.* Noah and his family.

This terrible catastrophe happened, according to the Hebrew copy of the Bible, 1656 years after the creation; according to the Samaritan copy, 1307. For the different conjectures concerning the natural causes of the flood, see the article DE-LUGE.

2. For the history of the second period we must again have recourse to the Scriptures, almost as much as for that of the first. We now find the human race reduced to eight persons possessed of nothing but what they had saved in the ark, and the whole world to be stored with animals from those which had been preserved along with these eight persons. In what country their original settlement was, no mention is made. The ark is supposed to have rested on Mount Ararat in Armenia; but it is impossible to know whether Noah and his sons made any stay in the neighbourhood of this mountain or not. Certain it is, that, some time after, the whole or the greatest part of the human race were assembled in Babylonia, where they engaged in building a tower. This gave offence to the Deity; so that he punished them by confounding their language; whence the division of mankind into different nations.

According to a common opinion, Noah, when dying, left the whole world to his sons, giving Asia to Shem, Africa to Ham, and Europe to Japhet. But this hath not the least foundation in Scripture. By the most probable accounts, Gomer the son of Japhet was the father of the Gomerians or Celtes; that is, all the barbarous nations who inhabited the northern parts of Europe under the various names of *Gauls*, *Cimbrians*, *Goths*, &c. and who also migrated into Spain, where they were called *Celtiberians*. From Magog, Meshech, and Tubal, three of Gomer's brethren, proceeded the Scythians, Sarmatians, Tartars, and Moguls. The three other sons of Japhet, Madai, Javan, and Tiras, are said to have been the fathers of the Medes, the Ionians, Greeks, and Thracians.

The children of Shem were Elam, Ashur, Arphaxad, Lud, and Aram. The first settled in Persia, where he was the father of that mighty nation: The descendants of Ashur peopled Assyria, (now *Curdistan*): Arphaxad settled in Chaldaea. Lud is supposed by Josephus to have taken up his residence in Lydia: though this is much controverted. Aram, with more certainty, is thought to have settled in Mesopotamia and Syria.

The children of Ham were Cush, Mizraim, Phut, and Canaan. The first is thought to have remained in Babylonia, and to have been king of the south-eastern parts of it, afterwards called *Kbuzestan*. His descendants are supposed to have removed into the eastern parts of Arabia; from whence they by degrees migrated into the corresponding part of Africa. The second peopled Egypt, Ethiopia, Cyrenaica, Libya, and the rest of the northern parts of the same continent. The place where Phut settled is not known: but Canaan is universally allowed to have settled in Phœnicia; and to have founded those nations who inhabited Judea, and were afterwards exterminated by the Jews.

Almost all the countries of the world, at least of the eastern continent, being thus furnished with inhabitants, it is probable that for many years there would be few or no quarrels between the different nations. The paucity of their numbers, their distance from one another, and their diversity of language, would contribute to keep them from having much communication with each other. Hence, according to the different circumstances in which the different tribes were placed, some would be more civilized and others more barbarous. In this interval also, the different nations probably acquired different characters, which afterwards they obstinately retained, and manifested on all occasions; hence the propensity of some nations to monarchy, as the Asiatics, and the enthusiastic desire of the Greeks for liberty and republicanisin, &c.

The beginning of monarchical government was very early; Nim-

rod the son of Cush having found means to make himself king of Babylonia. In a short time Ashur emigrated from the new kingdom; built Nineveh, afterwards capital of the Assyrian empire; and two other cities called *Razen* and *Reboboht*, concerning the situation of which we are now much in the dark. Whether Ashur at this time set up as a king for himself, or whether he held these cities as vassal to Nimrod, is now unknown. It is probable, however, that about the same time various kingdoms were founded in different parts of the world; and which were great or small according to different circumstances. Thus the Scripture mentions the kings of Egypt, Gerar, Sodom, Gomorrah, &c. in the time of Abraham; and we may reasonably suppose, that these kings reigned over nations which had existed for some considerable time before.

The first considerable revolution we read of is the migration of the Israelites out of Egypt, and their establishment in the land of Canaan. For the history of these transactions we must refer to the Old Testament, where the reader will see that it was attended with the most terrible catastrophe to the Egyptians, and with the utter extermination of some nations, the descendants of Ham, who inhabited Judæa. Whether the overthrow of Pharaoh in the Red Sea could affect the Egyptian nation in such a manner as to deprive them of the greatest part of their former learning, and to keep them for some ages after in a barbarous state, is not easily determined; but unless this was the case, it seems exceedingly difficult to account for the total silence of their records concerning such a remarkable event, and indeed for the general confusion and uncertainty in which the early history of Egypt is involved. The settlement of the Jews in the promised land of Canaan is supposed to have happened about 1491 B. C.

For near 200 years after this period we find no accounts of any other nations than those mentioned in Scripture. About 1280 B. C. the Greeks began to make other nations feel the effects of that enterprising and martial spirit for which they were so remarkable, and which they had undoubtedly exercised upon one another long before. Their first enterprise was an invasion of Colchis (now *Mingrelia*), for the sake of the golden fleece. Whatever was the nature of this expedition, it is probable they succeeded in it; and it is likewise probable, that it was this specimen of the riches of Asia which inclined them so much to Asiatic expeditions ever after. All this time we are totally in the dark about the state of Asia and Africa, except in so far as can be conjectured from Scripture. The ancient empires of Babylon, Assyria, and Persia, probably still continued in the former continent, and Egypt and Ethiopia seem to have been considerable kingdoms in the latter.

About 1184 years B. C. the Greeks again distinguished themselves by their expedition against Troy, a city of Phrygia Minor; which they plundered and burnt, massacring the inhabitants with the most unrelenting cruelty. Æneas, a Trojan prince, escaped with some followers into Italy, where he became the remote founder of the Roman empire. At this time Greece was divided into a number of small principalities, most of which seem to have been in subjection to Agamemnon, king of Mycenæ. In the reign of Atreus, the father of this Agamemnon, the Heraclidæ, or descendants of Hercules, who had been formerly banished by Eurystheus, were again obliged to leave this country. Under their champion Hylus they claimed the kingdom of Mycenæ as their right, pretending that it belonged to their great ancestor Hercules, who was unjustly deprived of it by Eurystheus. See HERCULES. The controversy was decided by single combat; but Hylus being killed, they departed, as had been before agreed, under a promise of not making any attempt to return for 50 years. About the time of the Trojan war, also, we find the Lydians, Mysians, and some other nations of Asia Minor, first mentioned in history.

The names of the Greek states mentioned during this uncertain period are: 1. Sicyon. 2. Leleg. 3. Messina. 4. Athens. 5. Crete. 6. Argos. 7. Sparta. 8. Pelasgia. 9. Theffaly. 10. Attica. 11. Phocis. 12. Locris. 13. Ozela. 14. Corinth. 15. Eleufina. 16. Elis. 17. Pilus. 18. Arcadia. 19. Egina. 20. Ithaca. 21. Cephalone. 22. Phthia. 23. Phocidia. 24. Ephyra. 25. Eolia. 26. Thebes. 27. Calista. 28. Etolia. 29. Doloppa. 30. Oechalia. 31. Mycenæ. 32. Eubœa. 33. Mynia. 34. Doris. 35. Phera. 36. Iola. 37. Trachina. 38. Thraſprocia. 39. Myrmidonia. 40. Salamine. 41. Scyros. 42. Hyperia or Melité. 43. The Vulcanian ifles. 44. Megara. 45. Epirus. 46. Achaia. 47. The ifles of the Egean Sea. Concerning many of theſe we know nothing beyond their names: the moſt remarkable particulars concerning the reſt may be found under their reſpective articles.

About 1048 B. C. the kingdom of Judea under king David approached its utmoſt extent of power. In its moſt flourishing condition, however, it never was remarkable for the largeneſs of its territory. In this reſpect it ſcarce exceeded the kingdom of Scotland; though, according to the accounts given in Scripture, the magnificence of Solomon was ſuperior to that of the moſt potent monarchs on earth. This extraordinary wealth was owing partly to the ſpoils amafſed by king David in his conqueſts over his various enemies, and partly to the commerce with the Eaſt Indies which Solomon had eſtabliſhed. Of this commerce he owed his ſhare to the friendſhip of Hiram king of Tyre, a city of Phœnicia, whoſe inhabitants were now the moſt famed for commerce and ſkill in maritime affairs of any in the whole world.

After the death of Solomon, which happened about 975 B. C. the Jewiſh empire began to decline, and ſoon after many powerful ſtates aroſe in different parts of the world. The diſpoſition of mankind in general ſeems now to have taken a new turn, not eaſily accounted for. In former times, whatever wars might have taken place between neighbouring nations, we have no account of any extenſive empire in the whole world, or that any prince undertook to reduce far diſtant nations to his ſubjection. The empire of Egypt indeed is ſaid to have been extended immenſely to the eaſt, even before the days of Seſoſtris. Of this country, however, our accounts are ſo imperfect, that ſcarce any thing can be concluded from them. But now, as it were all at once, we find almoſt every nation aiming at univerſal monarchy, and reſuſing to ſet any bounds whatever to its ambition. The firſt ſhock given to the Jewiſh grandeur was the diviſion of the kingdom into two through the imprudence of Rehoboam. This rendered it more eaſily a prey to Shiſhak king of Egypt; who five years after came and pillaged Jeruſalem, and all the fortified cities of the kingdom of Judea. The commerce to the Eaſt Indies was now diſcontinued, and conſequently the ſources of wealth in a great meaſure ſtopped; and this, added to the perpetual wars between the kings of Iſrael and Judea, contributed to that remarkable and ſpeedy decline which is now ſo eaſily to be obſerved in the Jewiſh affairs.

Whether this king Shiſhak was the Seſoſtris of profane writers or not, his expedition againſt Jeruſalem, as recorded in Scripture, ſeems very much to reſemble the deſultory conqueſts aſcribed to Seſoſtris. His infantry is ſaid to have been innumerable, compoſed of different African nations; and his cavalry, 60,000, with 1200 chariots; which agrees pretty well with the mighty armament attributed to Seſoſtris. Indeed his cavalry are ſaid to have been only 24,000; but the number of his chariots has alſo been reckoned at 27,000: which laſt may not unreaſonably be deemed an exaggeration, and theſe ſupernumerary chariots may have been only cavalry: but unleſs we allow Seſoſtris to be the ſame with Shiſhak, it ſeems impoſſible to fix

on any other king of Egypt that can be ſuppoſed to have undertaken this expedition in the days of Solomon.

Though the Jews obtained a temporary deliverance from Shiſhak, they were quickly after attacked by new enemies. In 541 B. C. one Zerah an Ethiopian invaded Judea with an army of a million of infantry and 300 chariots; but was defeated with great ſlaughter by Aſa king of Judea, who engaged him with an army of 580,000 men. About this time alſo we find the Syrians grown a conſiderable people, and bitter enemies both to the kings of Iſrael and Judea; aiming in fact at the conqueſt of both nations. Their kingdom commenced in the days of David, under Hadadezer, whoſe capital was Zobah, and who probably was at laſt obliged to become David's tributary, after having been defeated by him in ſeveral engagements. Before the death of David, however, one Rezon, who it ſeems had rebelled againſt Hadadezer, having found means to make himſelf maſter of Damafcus, erected there a new kingdom, which ſoon became very powerful. The Syrian princes being thus in the neighbourhood of the two rival ſtates of Iſrael and Judea (whoſe capitals were Samaria and Jeruſalem), found it an eaſy matter to weaken them both, by pretending to aſſiſt the one againſt the other; but a detail of the tranſactions between the Jews and Syrians is only to be found in the Old Teſtament, to which we refer. In 740 B. C. however, the Syrian empire was totally deſtroyed by Tiglath Piſeſer king of Aſſyria; as was alſo the kingdom of Samaria by Shalmaneſer his ſucceſſor in 721. The people were either maſſacred, or carried into captivity into Media, Perſia, and the countries about the Caſpian Sea.

While the nations of the eaſt were thus deſtroying each other, the foundations of very formidable empires were laid in the weſt, which in proceſs of time were to ſwallow up almoſt all the eaſtern ones. In Africa, Carthage was founded by a Tyrian colony, about 869 B. C. according to thoſe who aſcribe the higheſt antiquity to that city; but, according to others, it was founded only in 769 or 770 B. C. In Europe a very conſiderable revolution took place about 900 B. C. The Heraclidæ, whom we have formerly ſeen expelled from Greece by Atreus the father of Agamemnon, after ſeveral unſucceſſful attempts, at laſt conquered the whole Peloponneſus. From this time the Grecian ſtates became more civilized, and their hiſtory becomes leſs obſcure. The inſtitution, or rather the revival and continuance, of the Olympic games, in 776 B. C. alſo greatly facilitated the writing not only of their hiſtory, but that of other nations; for as each Olympiad conſiſted of four years, the chronology of every important event became indubitably fixed by referring it to ſuch and ſuch an Olympiad. In 748 B. C. or the laſt year of the ſeventh Olympiad, the foundations of the city of Rome were laid by Romulus; and, 43 years after, the Spartan ſtate was new modelled, and received from Lycurgus thoſe laws, by obſerving of which it afterwards arrived at ſuch a pitch of ſplendour.

3. With the beginning of the 28th Olympiad, or 568 B. C. commences the third general period above mentioned, when profane hiſtory becomes ſomewhat more clear, and the relations concerning the different nations may be depended upon with ſome degree of certainty. The general ſtate of the world was at that time as follows.—The northern parts of Europe were either thinly inhabited, or filled with unknown and barbarous nations, the anceſtors of thoſe who afterwards deſtroyed the Roman empire. France and Spain were inhabited by the Gomerians or Celtes. Italy was divided into a number of petty ſtates, ariſing partly from Gauliſh and partly from Grecian colonies; among which the Romans had already become formidable. They were governed by their king Servius Tullius; had increaſed their city by the demolition of Alba Longa, and the removal of its inhabitants to Rome; and had enlarged their

dominions by several cities taken from their neighbours. Greece was also divided into a number of small states, among which the Athenians and Spartans, being the most remarkable, were rivals to each other. The former had, about 599 B. C. received an excellent legislation from Solon, and were enriching themselves by navigation and commerce: the latter were become formidable by the martial institutions of Lycurgus; and having conquered Messina, and added its territory to their own, were justly esteemed the most powerful people in Greece. The other states of most consideration were Corinth, Thebes, Argos, and Arcadia.—In Asia great revolutions had taken place. The ancient kingdom of Assyria was destroyed by the Medes and Babylonians, its capital city Nineveh utterly ruined, and the greatest part of its inhabitants carried to Babylon. Nay, the very materials of which it was built were carried off, to adorn and give strength to that stately metropolis, which was then undoubtedly the first city in the world. Nebuchadnezzar, a wife and valiant prince, now sat on the throne of Babylon. By him the kingdom of Judea was totally overthrown in 587 B. C. Three years before this he had taken and razed the city of Tyre, and over-run all the kingdom of Egypt. He is even said by Josephus to have conquered Spain, and reigned there nine years, after which he abandoned it to the Carthaginians; but this seems by no means probable. The extent of the Babylonian empire is not certainly known: but, from what is recorded of it, we may conclude that it was not at all inferior even in this respect to any that ever existed; as the Scripture tells us it was superior in wealth to any of the succeeding ones. We know that it comprehended Phœnicia, Palestine, Syria, Babylonia, Media, and Persia, and not improbably India also; and from a consideration of this vast extent of territory, and the riches with which every one of these countries abounded, we may form some idea of the wealth and power of this monarch. When we consider also, that the whole strength of this mighty empire was employed in beautifying the metropolis, we cannot look upon the wonders of that city as related by Herodotus to be at all incredible. As to what passed in the republic of Carthage about this time, we are quite in the dark; there being a chasm in its history for no less than 300 years.

4. The fourth general period of history, namely, from the end of the fabulous times to the conquest of Babylon by Cyrus, is very short, including no more than 31 years. This sudden revolution was occasioned by the misconduct of Evil-merodach, Nebuchadnezzar's son, even in his father's lifetime. For having, in a great hunting match on occasion of his marriage, entered the country of the Medes, and some of his troops coming up at the same time to relieve the garrisons in those places, he joined them to those already with him, and without the least provocation began to plunder and lay waste the neighbouring country. This produced an immediate revolt, which quickly extended over all Media and Persia. The Medes, headed by Astyages and his son Cyaxares, drove back Evil-merodach and his party with great slaughter; nor doth it appear that they were afterwards reduced even by Nebuchadnezzar himself. The new empire continued daily to gather strength; and at last Cyrus, Astyages's grandson, a prince of great prudence and valour, being made generalissimo of the Median and Persian forces, took Babylon itself in the year 538. B. C.

During this period, the Romans increased in power under the wise administration of their king Servius Tullius, who, though a pacific prince, rendered his people more formidable by a peace of 20 years than his predecessors had done by all their victories. The Greeks, even at this early period, began to interfere with the Persians, on account of the Ionians or Grecian colonies in Asia Minor. These had been subdued by Crœsus king of Lydia about the year 562, the time of

Nebuchadnezzar's death. Whether the Lydians had been subdued by the Babylonish monarch or not, is not now to be ascertained; though it is very probable that they were either in subjection to him, or greatly awed by his power, as before his death nothing considerable was undertaken by them. It is indeed probable, that during the infancy of Nebuchadnezzar, spoken of by Daniel, the affairs of his kingdom would fall into confusion; and many of those princes whom he formerly retained in subjection would set up for themselves. Certain it is, however, that if the Babylonians did not regard Crœsus as their subject, they looked upon him to be a very faithful ally; inasmuch that they celebrated an annual feast in commemoration of a victory obtained by him over the Scythians. After the death of Nebuchadnezzar, Crœsus subdued many nations in Asia Minor, and among the rest the Ionians, as already related. They were, however, greatly attached to his government; for, though they paid him tribute, and were obliged to furnish him with some forces in time of war, they were yet free from all kind of oppression. When Cyrus therefore was proceeding in his conquests of different parts of the Babylonish empire, before he proceeded to attack the capital, the Ionians refused to submit to him, though he offered them very advantageous terms. But soon after, Crœsus himself being defeated and taken prisoner, the Ionians sent ambassadors to Cyrus, offering to submit on the terms which had formerly been proposed. These terms were now refused; and the Ionians, being determined to resist, applied to the Spartans for aid. Though the Spartans at that time could not be prevailed upon to give their countrymen any assistance, they sent ambassadors to Cyrus with a threatening message; to which he returned a contemptuous answer, and then forced the Ionians to submit at discretion, five years before the taking of Babylon. Thus commenced the hatred between the Greeks and Persians; and thus we see, that in the two first great monarchies the seeds of their destruction were sown even before the monarchies themselves were established. For while Nebuchadnezzar was raising the Babylonish empire to its utmost height, his son was destroying what his father built up; and at the very time when Cyrus was establishing the Persian monarchy, by his ill-timed severity to the Greeks he made that warlike people his enemies, whom his successors were by no means able to resist, and who would probably have overcome Cyrus himself, had they united in order to attack him. The transactions of Africa during this period are almost entirely unknown; though we cannot doubt that the Carthaginians enriched themselves by means of their commerce, which enabled them afterwards to attain such a considerable share of power.

5. Cyrus having now become master of all the east, the Asiatic affairs continued for some time in a state of tranquillity. The Jews obtained leave to return to their own country, rebuild their temple, and again establish their worship, of all which an account is given in the sacred writings, though undoubtedly they must have been in a state of dependance on the Persians from that time forward. Cambyfes, the successor of Cyrus, added Egypt to his empire, which had either not submitted to Cyrus, or revolted soon after his death. He intended also to have subdued the Carthaginians; but as the Phœnicians refused to supply him with ships to fight against their own countrymen, he was obliged to lay this design aside.

In 517 B. C. the Babylonians finding themselves grievously oppressed by their Persian masters, resolved to shake off the yoke, and set up for themselves. For this purpose, they took care to store their city with all manner of provisions; and when Darius Hystaspes, then king of Persia, advanced against them, they took the most barbarous method that can be imagined, of preventing an unnecessary consumption of those provisions which they had so carefully amassed. Having collected all the women, old men, and children, into one place, they strangled them with-

out distinction, whether wives, fathers, mothers, brothers, or sisters; every one being allowed to save only the wife he liked best, and a maid servant to do the work of the house. This cruel policy did not avail them: their city was taken by treachery (for it was impossible to take it by force); after which the king caused the walls of it to be beat down from 200 to 50 cubits height, that their strength might no longer give encouragement to the inhabitants to revolt. Darius then turned his arms against the Scythians; but finding that expedition turn out both tedious and unprofitable, he directed his course eastward, and reduced all the country as far as the river Indus. In the mean time, the Ionians revolted; and being assisted by the Greeks, a war commenced between the two nations, which was not thoroughly extinguished but by the destruction of the Persian empire in 330 B. C. The Ionians, however, were for this time obliged to submit, after a war of six years; and were treated with great severity by the Persians. The conquest of Greece itself was then projected: but the expeditions for that purpose ended most unfortunately for the Persians, and encouraged the Greeks to make reprisals on them, in which they succeeded according to their utmost wishes; and had it only been possible for them to have agreed among themselves, the downfall of the Persian empire would have happened much sooner than it did.

In 459 B. C. the Egyptians made an attempt to recover their liberty, but were reduced after a war of six years. In 413 B. C. they revolted a second time; and, being assisted by the Sydonians, drew upon the latter that terrible destruction foretold by the prophets; while they themselves were so thoroughly humbled, that they never after made any attempt to recover their liberty.

The year 403 B. C. proved remarkable for the revolt of Cyrus against his brother Artaxerxes Mnemon; in which, through his own rashness, he miscarried, and lost his life at the battle of Cunaxa in the province of Babylon. Ten thousand Greek mercenaries, who served in his army, made their way back into Greece, though surrounded on all sides by the enemy, and in the heart of a hostile country. In this retreat they were commanded by Xenophon, who has received the highest praises on account of his conduct and military skill in bringing it to a happy conclusion. Two years after, the invasions of Agesilaus king of Sparta threatened the Persian empire with total destruction; from which, however, it was relieved by his being recalled in order to defend his own country against the other Grecian states; and after this the Persian affairs continued in a more prosperous way till the time of Alexander.

During all this time, the volatile and giddy temper of the Greeks, together with their enthusiastic desire of romantic exploits, were preparing fetters for themselves, which indeed seemed to be absolutely necessary to prevent them from destroying one another. A zeal for liberty was what they all pretended; but, on every occasion, it appeared that this love of liberty was only a desire of dominion. No state in Greece could bear to see another equal to itself; and hence their perpetual contests for pre-eminence, which could not but weaken the whole body, and render them an easy prey to an ambitious and politic prince, who was capable of taking advantage of those divisions. Being all equally impatient of restraint, they never could bear to submit to any regular government; and hence their determinations were nothing but the decisions of a mere mob, of which they had afterwards almost constantly reason to repent. Hence also their base treatment of those eminent men whom they ought most to have honoured; as Miltiades, Aristides, Themistocles, Alcibiades, Socrates, Phocion, &c. The various transactions between the Grecian states, though they make a very considerable figure in particular history, make none at all in a general sketch of the history of the

world. We shall therefore only observe, that in 404 B. C. the Athenian power was in a manner totally broken by the taking of their city by the Spartans. In 370 that of the Spartans received a severe check from the Thebans at the battle of Leuctra; and eight years after was still further reduced by the battle of Mantinea. Epaminondas, the great enemy of the Spartans, was killed; but this only proved a more speedy means of subjugating all the states to a foreign, and at that time despicable, power. The Macedonians, a barbarous nation, lying to the north of the states of Greece, were two years after the death of Epaminondas reduced to the lowest ebb by the Illyrians, another nation of barbarians in the neighbourhood. The king of Macedon being killed in an engagement, Philip his brother departed from Thebes, where he had studied the art of war under Epaminondas, in order to take possession of his kingdom. Being a man of great prudence and policy, he quickly settled his own affairs; vanquished the Illyrians; and, being no stranger to the weakened situation of Greece, began almost immediately to meditate the conquest of it. The particulars of this enterprise are related in the ancient history of *Macedon*: here it is sufficient to take notice, that by first attacking those he was sure he could overcome, by corrupting those whom he thought it dangerous to attack, by sometimes pretending to assist one state and sometimes another, and by imposing upon all as best served his turn, he at last put it out of the power of the Greeks to make any resistance, at least such as could keep him from gaining his end. In 338 B. C. he procured himself to be elected general of the Amphictyons, or council of the Grecian states, under pretence of settling some troubles at that time in Greece; but having once obtained liberty to enter that country with an army, he quickly convinced the states that they must all submit to his will. He was opposed by the Athenians and Thebans; but the intestine wars of Greece had cut off all her great men, and no general was now to be found capable of opposing Philip with success.

The king of Macedon, being now master of all Greece, projected the conquest of Asia. To this he was encouraged by the ill success which had attended the Persians in their expeditions against Greece, the successes of the Greeks in their invasions, and the retreat of the ten thousand under Xenophon. All these events showed the weakness of the Persians, their vast inferiority to the Greeks in military skill, and how easily their empire might be overthrown by a proper union among the states.

Philip was preparing to enter upon his grand design, when he was murdered by some assassins. His son Alexander was possessed of every quality necessary for the execution of so great a plan: and his impetuosity of temper made him execute it with a rapidity unheard of either before or since. It must be confessed, indeed, that the Persian empire was now ripe for destruction, and could not in all probability have withstood an enemy much less powerful than Alexander. The Asiatics have in all ages been much inferior to the European nations in valour and military skill. They were now sunk in luxury and effeminacy; and what was worse, they seem at this period to have been seized with that insatiation and distraction of counsels which scarce ever fails to be a forerunner of the destruction of any nation. The Persian ministers persuaded their sovereign to reject the prudent advice that was given him, of distressing Alexander by laying waste the country, and thus forcing him to return for want of provisions. Nay, they even prevented him from engaging the enemy in the most proper manner, by dividing his forces; and persuaded him to put Charidemus the Athenian to death, who had promised, with 100,000 men, of whom one third were mercenaries, to drive the Greeks out of Asia. In short, Alexander met with only two checks in his Persian expedition. The one was from the city of Tyre,

which for seven months resisted his utmost efforts; the other was from Memnon the Rhodian, who had undertaken to invade Macedonia. The first of these obstacles Alexander at last got over, and treated the governor and inhabitants with the utmost cruelty. The other was scarce felt; for Memnon died after reducing some of the Grecian islands, and Darius had no other general capable of conducting the undertaking. The power of the Persian empire was totally broken by the victory gained over Darius at Arbela in 331 B. C. and next year a total end was put to it by the murder of the king by Bessus one of his subjects.

The ambition of Alexander was not to be satisfied with the possession of the kingdom of Persia, or indeed of any other on earth. Nothing less than the total subjection of the world itself seemed sufficient to him; and therefore he was now prompted to invade every country of which he could only learn the name, whether it had belonged to the Persians or not. In consequence of this disposition he invaded and reduced Hyrcania, Bactria, Sogdia, and all that vast tract of country now called *Bukharia*. At last, having entered India, he reduced all the nations to the river Hyphasis, one of the branches of the Indus. But when he would have proceeded farther, and extended his conquests quite to the eastern extremities of Asia, his troops positively refused to follow him farther, and he was constrained to return. In 323, this mighty conqueror died of a fever; without having time to settle the affairs of his vast extended empire, or even to name his successor.

While the Grecian empire thus suddenly sprang up in the east, the rival states of Rome and Carthage were making considerable advances in the west. The Romans were establishing their empire on the most solid foundations; to which their particular situation naturally contributed. Being originally little better than a parcel of lawless banditti, they were despised and hated by the neighbouring states. This soon produced wars; in which, at first from accidental circumstances, and afterwards from their superior valour and conduct, the Romans proved almost constantly victorious. The jealousies which prevailed among the Italian states, and their ignorance of their true interest, prevented them from combining against that aspiring nation, and crushing it in its infancy, which they might easily have done; while in the mean time the Romans, being kept in a state of continual warfare, became at last such expert soldiers, that no other state on earth could resist them. During the time of their kings, they had made a very considerable figure among the Italian nations; but after their expulsion, and the commencement of the republic, their conquests became much more rapid and extensive. In 501 B. C. they subdued the Sabines; eight years after, the Latins; and in 399 the city of Veii, the strongest in Italy excepting Rome itself, was taken after a siege of ten years. But in the midst of their successes a sudden irruption of the Gauls had almost put an end to their power and nation at once. The city was burnt to the ground in 383 B. C. and the capitol on the point of being surprised, when the Gauls, who were climbing up the walls in the night, were accidentally discovered and repulsed. In a short time Rome was rebuilt with much greater splendor than before, but now a general revolt and combination of the nations formerly subdued took place. The Romans, however, still got the better of their enemies; but, even at the time of the celebrated Camillus's death, which happened about 352 B. C. their territories scarce extended six or seven leagues from the capital. The republic from the beginning was agitated by those dissensions which at last proved its ruin. The people had been divided by Romulus into two classes, namely *Patricians* and *Plebeians*, answering to our nobility and commonalty. Between these two bodies were perpetual jealousies and contentions; which retarded the progress of the Roman conquests, and revived

the hopes of the nations they had conquered. The tribunes of the people were perpetually opposing the consuls and military tribunes. The senate had often recourse to a dictator endowed with absolute power; and then the valour and experience of the Roman troops made them victorious: but the return of domestic seditions gave the subjugated nations an opportunity of shaking off the yoke. Thus had the Romans continued for near 400 years, running the same round of wars with the same enemies, and reaping very little advantage from their conquests, till at last matters were compounded by choosing one of the consuls from among the plebeians; and from this time chiefly we may date the prosperity of Rome, so that by the time that Alexander the Great died they were held in considerable estimation among foreign nations.

The Carthaginians in the mean time continued to enrich themselves by commerce; but, being less conversant in military affairs, were by no means equal to the Romans in power, though they excelled them in wealth. A new state, however, makes its appearance during this period, which may be said to have taught the Carthaginians the art of war, and, by bringing them into the neighbourhood of the Romans, proved the first source of contention between these two powerful nations. This was the island of Sicily. At what time people were first settled on it, is not now to be ascertained. The first inhabitants we read of were called *Sicani*, *Siculi*, *Læstrigones*, &c. but of these we know little or nothing. In the second year of the 17th Olympiad, or 710 B. C. some Greek colonies are said to have arrived on the island, and in a short time founded several cities, of which Syracuse was the chief. The Syracusans at last subdued the original inhabitants; though it does not appear that the latter were ever well affected to their government, and therefore were on all occasions ready to revolt. The first considerable prince, or (as he is called by the Greeks) *tyrant* of Syracuse, was Gelon, who obtained the sovereignty about the year 483 B. C. At what time the Carthaginians first carried their arms into Sicily is not certainly known; only we are assured, that they possessed some part of the island as early as 505 B. C. For in the time of the first consuls, the Romans and Carthaginians entered into a treaty chiefly in regard to matters of navigation and commerce; by which it was stipulated, that the Romans should touch at Sardinia, or that part of Sicily which belonged to Carthage, should be received there in the same manner as the Carthaginians themselves. Whence it appears, that the dominion of Carthage already extended over Sardinia and part of Sicily: but in 28 years after, they had been totally driven out by Gelon; which probably was the first exploit performed by him. This appears from his speech to the Athenian and Spartan ambassadors, who desired his assistance against the forces of Xerxes king of Persia. The Carthaginians made many attempts to regain their possessions in this island, which occasioned long and bloody wars between them and the Greeks. This island also proved the scene of much slaughter and bloodshed in the wars of the Greeks, with one another. Before the year 323 B. C. however, the Carthaginians had made themselves masters of a very considerable part of the island; from whence all the power of the Greeks could not dislodge them. It is proper also to observe, that after the destruction of Tyre by Alexander the Great, almost all the commerce in the western part of the world fell to the share of the Carthaginians. Whether they had at this time made any settlements in Spain, is not known. It is certain, that they traded to that country for the sake of the silver, in which it was very rich; as they probably also did to Britain for the tin with which it abounded.

6. The beginning of the sixth period presents us with a state of the world entirely different from the foregoing. We now behold all the eastern part of the world, from the confines of

Italy to the river Indus, and beyond it, newly united into one vast empire, and at the same time ready to fall to pieces for want of a proper head; the western world filled with fierce and savage nations, whom the rival republics of Carthage and Rome were preparing to enslave as fast as they could. The first remarkable events took place in the Macedonian empire.—Alexander, as already observed, had not distinctly named any successor; but he had left behind him a victorious, and, we may say, invincible army, commanded by most expert officers, all of them ambitious of supreme authority. It is not to be supposed that peace could long be preserved in such a situation. For a number of years, indeed, nothing was to be seen or heard of but the most horrid slaughters, and wickedness of every kind; until at last the mother, wives, children, brothers, and even sisters of Alexander were cut off; not one of the family of that great conqueror being left alive. When matters were a little settled, four new empires, each of them of no small extent, had arisen out of the empire of Alexander. Cassander, the son of Antipater, had Macedonia, and all Greece; Antigonus, Asia Minor; Seleucus had Babylon, and the eastern provinces; and Ptolemy Lagus, Egypt, and the western ones. One of these empires, however, quickly fell; Antigonus being defeated and killed by Seleucus and Lysimachus at the battle of Ipsus, in 301 B. C. The greatest part of his dominions then fell to Seleucus: but several provinces took the opportunity of these confusions to shake off the Macedonian yoke altogether; and thus were formed the kingdoms of Pontus, Bithynia, Pergamus, Armenia, and Cappadocia. The two most powerful and permanent empires, however, were those of Syria founded by Seleucus, and Egypt by Ptolemy Lagus. The kings of Macedon, though they did not preserve the same authority over the Grecian states that Alexander, Antipater and Cassander had done, yet effectually prevented them from those outrages upon one another, for which they had formerly been so remarkable. Indeed it is somewhat difficult to determine, whether their condition was better or worse than before they were conquered by Philip; since, though they were now prevented from destroying one another, they were most grievously oppressed by the Macedonian tyrants.

While the eastern parts of the world were thus deluged with blood, and the successors of Alexander were pulling to pieces the empire which he had established; the Romans and Carthaginians proceeded in their attempts to enslave the nations of the west. The Romans, ever engaged in war, conquered one city and state after another, till about the year 253 B. C. they had made themselves masters of almost the whole of Italy. During all this time they had met only with a single check in their conquests; and that was the invasion of Pyrrhus king of Epirus. That ambitious and fickle prince had projected the conquest of Italy, which he fancied would be an easy matter. Accordingly, in 271 B. C. he entered that country, and maintained a war with the Romans for six years; till at last, being utterly defeated by Curius Dentatus, he was obliged to return.

The Romans had no sooner made themselves masters of Italy, than they wanted only a pretence to carry their arms out of it; and this pretence was soon found out. Being invited into Sicily to assist the Mamertines against Hiero king of Syracuse and the Carthaginians, they immediately commenced a war with the latter, which continued with the utmost fury for 23 years. The war ended greatly to the disadvantage of the Carthaginians, chiefly owing to the bad conduct of their generals: none of whom, Hamilcar Barcas alone excepted, seem to have been possessed of any degree of military skill; and the state had suffered too many misfortunes before he entered upon the command, for him or any other to retrieve it at that time. The consequence of this war was the entire loss of Sicily to the Carthaginians; and soon after, the Romans seized on the island of Sardinia.

Hamilcar perceiving that there was now no alternative, but that in a short time either Carthage must conquer Rome, or Rome would conquer Carthage, bethought himself of a method by which his country might become equal to that haughty republic. This was by reducing all Spain, in which the Carthaginians had already considerable possessions, and from the mines of which they drew great advantages. He had, therefore, no sooner finished the war with the mercenaries, which succeeded that with the Romans, than he set about the conquest of Spain. This, however, he did not live to accomplish, though he made great progress in it. His son Asdrubal continued the war with success; till at last, the Romans, jealous of his progress, persuaded him to enter into a treaty with them, by which he engaged himself to make the river Iberus the boundary of his conquests. This treaty probably was never ratified by the senate of Carthage; nor, though it had, would it have been regarded by Hannibal, who succeeded Asdrubal in the command, and had sworn perpetual enmity with the Romans. The transactions of the second Punic war are perhaps the most remarkable which the history of the world can afford. Certain it is, that nothing can show more clearly the slight foundations upon which the greatest empires are built. We now see the Romans, the nation most remarkable for their military skill in the whole world, and who, for more than 500 years, had been constantly victorious, unable to resist the efforts of one single man. At the same time we see this man, though evidently the first general in the world, lost solely for want of a little support. In former times, the republic of Carthage supplied her generals in Sicily with hundreds of thousands, though their enterprises were almost constantly unsuccessful; but now Hannibal, the conqueror of Italy, was obliged to abandon his design, merely for want of 20 or 30,000 men. That degeneracy and infatuation, which never fails to overwhelm a falling nation, or rather which is the cause of its fall, had now infected the counsels of Carthage, and the supplies were denied. Neither was Carthage the only infatuated nation at this time. Hannibal, whose prudence never forsook him either in prosperity or adversity, in the height of his good fortune had concluded an alliance with Philip king of Macedon. Had that prince sent an army to the assistance of the Carthaginians in Italy immediately after the battle of Cannæ, there can be no doubt but the Romans would have been forced to accept of that peace which they so haughtily refused; and indeed, this offer of peace, in the midst of so much success, is an instance of moderation which perhaps does more honour to the Carthaginian general than all the military exploits he performed. Philip, however, could not be roused from his indolence, nor see that his own ruin was connected with that of Carthage. The Romans had now made themselves masters of Sicily: after which they recalled Marcellus, with his victorious army, to be employed against Hannibal; and the consequence at last was, that the Carthaginian armies, unsupported in Italy, could not conquer it, but were recalled into Africa, which the Romans had invaded. The southern nations seem to have been as blind to their own interest as the northern ones. They ought to have seen, that it was necessary for them to preserve Carthage from being destroyed; but instead of this, Masinissa king of Numidia allied with the Romans, and by his means Hannibal was overcome at the battle of Zama, which finished the second Punic war, in the year 188 B. C.

The event of the second Punic war determined the fate of almost all the other nations in the world. All this time, indeed, the empires of Egypt, Syria, and Greece, had been promoting their own ruin by mutual wars and intestine divisions. The Syrian empire was now governed by Antiochus the Great, who seems to have had little right to such a title. His empire, though diminished by the defection of the Parthians, was still

very powerful; and to him Hannibal applied, after he was obliged to leave his country. Antiochus, however, had not sufficient judgment to see the necessity of following that great man's advice; nor would the Carthaginians be prevailed upon to contribute their assistance against the nation which was soon to destroy them without any provocation. The pretence for war on the part of the Romans was, that Antiochus would not declare his Greek subjects in Asia to be free and independent states; a requisition which neither the Romans nor any other nation had a right to make. The event of all was, that Antiochus was every where defeated, and forced to conclude a peace upon very disadvantageous terms.

In Europe, matters went on in the same way; the states of Greece, weary of the tyranny of the Macedonians, entered into a resolution of recovering their liberties. For this purpose was framed the Achæan League; but, as they could not agree among themselves, they at last came to the imprudent determination of calling in the Romans to defend them against Philip king of Macedon. This produced a war, in which the Romans were victorious. The Macedonians, however, were still formidable; and, as the intention of the Romans to enslave the whole world could no longer be doubted, Perseus, the successor of Philip, renewed the war. Through his own cowardice he lost a decisive engagement, and with it his kingdom, which submitted to the Romans in 167 B. C.

Macedon being thus conquered, the next step was utterly to exterminate the Carthaginians; whose republic, notwithstanding the many disasters that had befallen it, was still formidable. It is true, the Carthaginians were giving no offence; nay, they even made the most abject submissions to the republic of Rome: but all was not sufficient. War was declared a third time against that unfortunate state; there was now no Hannibal to command their armies, and the city was utterly destroyed 146 B. C. The same year the Romans put an end to the liberties they had pretended to grant the cities of Greece, by the entire destruction of *Corinth*.

After the death of Antiochus the Great, the affairs of Syria and Egypt went on from bad to worse. The degenerate princes which filled the thrones of those empires, regarding only their own pleasures, either spent their time in oppressing their subjects, or in attempting to deprive each other of their dominions, by which means they became a more easy prey to the Romans. So far indeed were they from taking any means to secure themselves against the overgrown power of that republic, that the kings both of Syria and Egypt sometimes applied to the Romans as protectors. Their downfall, however, did not happen within the period of which we now treat.—The only other transaction which makes any considerable figure in the Syrian empire is the oppression of the Jews by Antiochus Epiphanes. After their return from the Babylonish captivity, they continued in subjection to the Persians till the time of Alexander. From that time they were subject to the kings of Egypt or Syria, as the fortune of either happened to prevail. Egypt being reduced to a low ebb by Antiochus Epiphanes, the Jews fell under his dominion; and being severely treated by him, imprudently showed some signs of joy on a report of his death. This brought him against them with a powerful army; and in 170 B. C. he took Jerusalem by storm, committing the most horrid cruelties on the inhabitants, inasmuch that they were obliged to hide themselves in caverns and in holes of rocks to avoid his fury. Their religion was totally abolished, their temple profaned, and an image of Jupiter Olympius set up on the altar of burnt-offerings: which profanation is thought to be the *abomination of desolation* mentioned by the prophet Daniel. This revolution, however, was of no long continuance. In 167 B. C. Mattathias restored the true worship in most of the cities of Judea; and in 165 the temple was purified, and the worship

there restored by Judas Maccabæus. This was followed by a long series of wars between the Syrians and Jews, in which the latter were almost always victorious; and before these wars were finished, the destruction of Carthage happened, which puts an end to the sixth general period formerly mentioned.

7. The beginning of the seventh period presents us with a view of the ruins of the Greek empire in the declining states of Syria and Egypt; both of them much circumscribed in bounds. The empire of Syria at first comprehended all Asia to the river Indus, and beyond it; but in 312 B. C. most of the Indian provinces were by Seleucus ceded to one *Sandrocottus*, or *Androcottus*, a native, who in return gave him 500 elephants. Of the empire of Sandrocottus we know nothing farther than that he subdued all the countries between the Indus and the Ganges; so that from this time we may reckon the greatest part of India independent on the Syro-Macedonian princes. In 250 B. C. however, the empire sustained a much greater loss by the revolt of the Parthians and Bactrians from Antiochus Theus. The former could not be subdued; and as they held in subjection to them the vast tract which now goes under the name of *Persia*, we must look upon their defection as an irreparable loss. Whether any part of their country was afterwards recovered by the kings of Egypt or Syria, is not very certain; nor is it of much consequence, since we are assured that in the beginning of the seventh period, i. e. 146 B. C. the Greek empires of Syria and Egypt were reduced by the loss of India, Persia, Armenia, Pontus, Bithynia, Cappadocia, Pergamus, &c. The general state of the world in 146 B. C. therefore was as follows. In Asia were the empires of India, Parthia, and Syria, with the lesser states of Armenia, Pontus, &c. above mentioned; to which we must add that of Arabia, which during the sixth period had grown into some consequence, and had maintained its independence from the days of Ishmael the son of Abraham. In Africa were the kingdoms of Egypt and Ethiopia; the Carthaginian territories, now subject to the Romans; and the kingdoms of Numidia, Mauritania, and Getulia, ready to be swallowed up by the same ambitious and insatiable power, now that Carthage was destroyed, which served as a barrier against it. To the south lay some unknown and barbarous nations, secure by reason of their situation and insignificance, rather than their strength, or distance from Rome. In Europe we find none to oppose the progress of the Roman arms, except the Gauls, Germans, and some Spanish nations. These were brave indeed; but through want of military skill, incapable of contending with such masters in the art of war as the Romans then were.

The Spaniards had indeed been subdued by Scipio Africanus in the time of the second Punic war: but, in 155 B. C. they revolted; and, under the conduct of one Viriathus, formerly a robber, held out for a long time against all the armies the Romans could send into Spain. Him the consul Cæpio caused to be murdered about 138 B. C. because he found it impossible to reduce him by force. The city of Numantia defied the whole Roman power for six years longer; till at last, by dint of treachery, numbers, and perseverance, it was not taken, but the inhabitants, reduced to extremity by famine, set fire to their houses, and perished in the flames, or killed one another, so that not one remained to grace the triumph of the conqueror: and this for the present quieted the rest of the Spaniards. About the same time Attalus, king of Pergamus, left by will the Roman people heirs to all his goods; upon which they immediately seized on his kingdom as part of those goods, and reduced it to a Roman province, under the name of *Asia Proper*. Thus they continued to enlarge their dominions on every side, without the least regard to justice, to the means they employed, or to the miseries they brought upon the conquered people. In 122 B. C. the Balearic islands, now called *Majorca*, *Minorca*, and *Ivica*, were subdued, and the inhabitants exterminated; and, soon

after, several of the nations beyond the Alps were obliged to submit.

In Africa the crimes of Jugurtha soon gave this ambitious republic an opportunity of conquering the kingdoms of Numidia and Mauritania: and indeed this is almost the only war in which we find the Romans engaged where their pretensions had the least colour of justice; though in no case whatever could a nation show more degeneracy than the Romans did on this occasion. The event of it was the total reduction of the former about the year 105 B. C. but Mauritania and Getulia preserved their liberty for some time longer.

In the east, the empire of Syria continued daily to decline; by which means the Jews not only had an opportunity of recovering their liberty, but even of becoming as powerful, or at least of extending their dominions as far as in the days of David and Solomon. This declining empire was still farther reduced by the civil dissensions between the two brothers Antiochus Grypus and Antiochus Cyzicenus; during which the cities of Tyre, Sidon, Ptolemais, and Gaza, declared themselves independent, and in other cities tyrants started up who refused allegiance to any foreign power. This happened about 100 B. C.; and 17 years after, the whole was reduced by Tigranes king of Armenia. On his defeat by the Romans, the latter reduced Syria to a province of their empire. The kingdom of Armenia itself, with those of Pontus, Cappadocia, and Bithynia, soon shared the same fate; Pontus, the most powerful of them all, being subdued about 64 B. C. The kingdom of Judea also was reduced under the same power much about this time. This state owed the loss of its liberty to the same cause that had ruined several others, namely, calling in the Romans as arbitrators between two contending parties. The two sons of Alexander Jannæus (Hyrcanus and Aristobulus) contended for the kingdom. Aristobulus, being defeated by the party of Hyrcanus, applied to the Romans. Pompey the Great, who acted as ultimate judge in this affair, decided it against Aristobulus, but at the same time deprived Hyrcanus of all power as a king; not allowing him even to assume the regal title, or to extend his territory beyond the ancient borders of Judea. To such a length did Pompey carry this last article, that he obliged him to give up all those cities in Cœlosyria and Phœnicia which had been gained by his predecessors, and added them to the newly acquired Roman province of Syria.

Thus the Romans became masters of all the eastern parts of the world, from the Mediterranean sea to the borders of Parthia. In the west, however, the Gauls were still at liberty, and the Spanish nations bore the Roman yoke with great impatience. The Gauls infested the territories of the republic by their frequent incursions, which were sometimes very terrible; and though several attempts had been made to subdue them, they always proved insufficient till the time of Julius Cæsar. By him they were totally reduced, from the river Rhine to the Pyrenean mountains, and many of their nations almost exterminated. He carried his arms also into Germany and the southern parts of Britain; but in neither of these parts did he make any permanent conquests. The civil wars between him and Pompey gave him an opportunity of seizing on the kingdom of Mauritania and those parts of Numidia which had been allowed to retain their liberty. The kingdom of Egypt alone remained, and to this nothing belonged except the country properly so called. Cyrenaica was bequeathed by will to the Romans about 58 B. C. and about the same time the island of Cyprus was seized by them without any pretence, except a desire of possessing the treasure of the king.—The kingdom of Egypt continued for some time longer at liberty; which in some measure must be ascribed to the internal dissensions of the republic, but more especially to the amours of Pompey, Julius Cæsar, and Marc Antony, with the famous Cleopatra queen of Egypt. The

battle of Actium, however, determined the fate of Antony, Cleopatra, and Egypt itself; which last was reduced to a Roman province about 9 B. C.

While the Romans thus employed all means to reduce the world to their obedience, they were making one another feel the same miseries at home which they inflicted upon other nations abroad. The first civil dissensions took their rise at the siege of Numantia in Spain. We have already observed, that this small city resisted the whole power of the Romans for six years. Once they gave them a most terrible and shameful defeat, wherein 30,000 Romans fled before 4000 Numantines. Twenty thousand were killed in the battle, and the remaining ten thousand so shut up that there was no possibility of escaping. In this extremity they were obliged to negotiate with the enemy, and a peace was concluded upon the following terms: 1. That the Numantines should suffer the Romans to retire unmolested; and, 2. That Numantia should maintain its independence, and be reckoned among the Roman allies.—The Roman senate, with an injustice and ingratitude hardly to be matched, broke this treaty, and in return ordered the commander of their army to be delivered up to the Numantines: but they refused to accept of him, unless his army was delivered along with him; upon which the war was renewed; and ended as already related. The fate of Numantia, however, was soon revenged. Tiberius Sempronius Gracchus, brother-in-law to Scipio Africanus the second, had been a chief promoter of the peace with the Numantines already mentioned, and of consequence had been in danger of being delivered up to them along with the commander in chief. This disgrace he never forgot; and, in order to revenge himself, undertook the cause of the Plebeians against the Patricians, by whom the former were greatly oppressed. He began with reviving an old law, which had enacted that no Roman citizen should possess more than 500 acres of land. The overplus he designed to distribute among those who had no lands, and to reimburse the rich out of the public treasury. This law met with great opposition, bred many tumults, and at last ended in the death of Gracchus and the persecution of his friends, several hundreds of whom were put to cruel deaths without any form of law.

The disturbances did not cease with the death of Gracchus. New contests ensued on account of the Sempronian law, and the giving to the Italian allies the privilege of Roman citizens. This last not only produced great commotions in the city, but occasioned a general revolt of the states of Italy against the republic of Rome. This rebellion was not quelled without the utmost difficulty: and in the mean time, the city was deluged with blood by the contending factions of Sylla and Marius; the former of whom sided with the Patricians, and the latter with the Plebeians. These disturbances ended in the perpetual dictatorship of Sylla, about 80 B. C.

From this time we may date the loss of the Roman liberty; for though Sylla resigned his dictatorship two years after, the succeeding contests between Cæsar and Pompey proved equally fatal to the republic. These contests were decided by the battle of Pharfalia, by which Cæsar became in effect master of the empire in 43 B. C. Without loss of time he then crossed over into Africa; totally defeated the republican army in that continent; and, by reducing the country of Mauritania to a Roman province, completed the Roman conquests in these parts. His victory over the sons of Pompey at Munda 40 B. C. secured him from any further apprehensions of a rival. Being therefore sole master of the Roman empire, and having all the power of it at his command, he projected the greatest schemes; tending, according to some, not less to the happiness than to the glory of his country: when he was assassinated in the senate-house, in the 56th year of his age, and 39 B. C.

Without investigating the political justice of this action, or

the motives of the perpetrators, it is impossible not to regret the death of this great man, when we contemplate his virtues, and the designs which he is said to have formed. Nor is it possible to justify, from ingratitude at least, even the most virtuous of the conspirators, when we consider the obligations under which they lay to him. And as to the measure itself, even in the view of expediency, it seems to be generally condemned. In fact, from the transactions which had long preceded, as well as those which immediately followed the murder of Cæsar, it is evident that Rome was incapable of preserving its liberty any longer, and that the people had become unfit for being free. The efforts of Brutus and Cassius were therefore unsuccessful, and ended in their own destruction and that of great numbers of their followers in the battle of Philippi. The defeat of the republicans was followed by numberless disturbances, murders, proscriptions, &c. till at last Octavianus, having cut off all who had the courage to oppose him, and finally got the better of his rivals by the victory at Actium, put an end to the republic in the year 27 B. C.

The destruction of the Roman commonwealth proved advantageous to the few nations of the world who still retained their liberty. That outrageous desire of conquest, which had so long marked the Roman character, now in a great measure ceased; because there was now another way of satisfying the desires of ambitious men, namely, by courting the favour of the emperor. After the final reduction of the Spaniards, therefore, and the conquest of the countries of Mæsia, Pannonia, and some others adjacent to the Roman territories, and which in a manner seemed naturally to belong to them, the empire enjoyed for some time a profound peace.

The only remarkable transactions which took place during the remainder of the period of which we treat, were the conquest of Britain by Claudius and Agricola, and the destruction of Jerusalem by Vespasian and Titus. The war with the Jews began A. D. 67; and was occasioned by their obstinately claiming the city of Cæsarea, which the Romans had added to the province of Syria. It ended in 73, with the most terrible destruction of their city and nation; since which time they have never been able to assemble as a distinct people. The southern parts of Britain were totally subdued by Agricola about ten years after.

In the 98th year of the Christian era, Trajan was created emperor of Rome; and being a man of great valour and experience in war, carried the Roman conquests to their utmost extent. Having conquered the Dacians, a German nation beyond the Danube, and who had of late been very troublesome, he turned his arms eastward; reduced all Mesopotamia, Chaldæa, Assyria; and having taken Ctesiphon, the capital of the Parthian empire, appointed them a king, which he thought would be a proper method of keeping that warlike people in subjection. After this, he proposed to return to Italy, but died by the way; and with his reign the seventh general period above mentioned is concluded.

8. The beginning of the eighth period presents us with a view of one vast empire, in which almost all the nations of the world were swallowed up. This empire comprehended the best part of Britain, all Spain, France, the Netherlands, Italy, part of Germany, Egypt, Barbary, Bildulgerid, Turkey in Europe, Turkey in Asia, and Persia. The state of India at this time is unknown. The Chinese lived in a remote part of the world, unheard of and unmolested by the western nations who struggled for the empire of the world. The northern parts of Europe and Asia were filled with barbarous nations, already formidable to the Romans, and who were soon to become more so. The vast empire of the Romans, however, had no sooner attained its utmost degree of power, than, like others before it, it began to decline. The provinces of Babylonia, Mesopotamia, and As-

syria, almost instantly revolted, and were abandoned by Adrian the successor of Trajan in the empire. The Parthians, having recovered their liberty, continued to be very formidable enemies, and the barbarians of the northern parts of Europe continued to increase in strength; while the Romans, weakened by intestine divisions, became daily less able to resist them. At different times, however, some warlike emperors arose, who put a stop to the incursions of these barbarians; and about the year 215, the Parthian empire was totally overthrown by the Persians, who had long been subject to them. This revolution proved of little advantage to the Romans. The Persians were enemies still more troublesome than the Parthians had been; and though often defeated, they still continued to infest the empire on the east, as the barbarous nations of Europe did on the north. In 260, the defeat and captivity of the emperor Valerian by the Persians, with the disturbances which followed, threatened the empire with utter destruction. Thirty tyrants seized the government at once, and the barbarians pouring in on all sides in prodigious numbers ravaged almost all the provinces of the empire. By the vigorous conduct of Claudius, Aurelian, Tacitus, Probus, and Carus, the empire was restored to its former lustre; but as the barbarians were only repulsed, and never thoroughly subdued, this proved only a temporary relief. What was worse, the Roman soldiers, grown impatient of restraint, commonly murdered those emperors who attempted to revive among them the ancient military discipline which alone could ensure the victory over their enemies. Under Dioclesian, the disorders were so great, that though the government was held by two persons, they found themselves unable to bear the weight of it, and therefore took other two partners in the empire. Thus was the Roman empire divided into four parts; which by all historians is said to have been productive of the greatest mischiefs. As each of the four sovereigns would have as many officers both civil and military, and the same number of forces that had been maintained by the state when governed only by one emperor, the people were not able to pay the sums necessary for supporting them. Hence the taxes and imposts were increased beyond measure, the inhabitants in several provinces reduced to beggary, the land left untilld for want of hands, &c. An end was put to these evils when the empire was again united under Constantine the Great; but in 330 a mortal blow was given to it, by removing the imperial seat to Byzantium, now Constantinople, and making it equal to Rome. The introduction and establishment of Christianity, already corrupted with the grossest superstitions, proved also a most grievous detriment to the empire. Instead of that ferocious and obstinate valour in which the Romans had so long been accustomed to put their trust, they now imagined themselves secured by signs of the cross, and other external symbols of the Christian religion. These they used as a kind of magical incantations, which of course proved at all times ineffectual; and hence also in some measure proceeded the great revolution which took place in the next period.

9. The ninth general period shows us the decline and miserable end of the western part of the Roman empire. We see that mighty empire, which formerly occupied almost the whole world, now weakened by division, and surrounded by enemies. On the east, the Persians; on the north, the Scythians, Sarmatians, Goths, and a multitude of other barbarous nations, watched all occasions to break into it; and miscarried in their attempts, rather through their own barbarity, than the strength of their enemies. The devastations committed by those barbarians when they made their incursions are incredible, and the relation shocking to human nature. Some authors seem much inclined to favour them; and even insinuate, that barbarity and ignorant ferocity were their chief if not their only faults: but from their history it plainly appears, that not only barbarity and the most shocking cruelty, but the highest degrees of avarice, per-

fidy, and disregard to the most solemn promises, were to be numbered among their vices. It was ever a sufficient reason for them to make an attack, that they thought their enemies could not resist them. Their only reason for making peace, or for keeping it, was because their enemies were too strong; and their only reason for committing the most horrid massacres, rapes, and all manner of crimes, was because they had gained a victory. The Romans, degenerate as they were, are yet to be esteemed much better than these savages; and therefore we find not a single province of the empire that would submit to the barbarians while the Romans could possibly defend them.

Some of the Roman emperors indeed withstood this inundation of savages; but as the latter grew daily more numerous, and the Romans continued to weaken themselves by their intestine divisions, they were at last obliged to take large bodies of barbarians into their pay, and teach them their military discipline, in order to drive away their countrymen, or others who invaded the empire. This at last proved its total destruction; for, in 476, the barbarians who served in the Roman armies, and were dignified with the title of *allies*, demanded the third part of the lands of Italy as a reward for their services: but meeting with a refusal, they revolted, and made themselves masters of the whole country, and of Rome itself, which from that time ceased to be the head of an empire of any consequence.

This period exhibits a most unfavourable view of the western parts of the world: The Romans, from the height of grandeur, sunk to the lowest slavery, nay, in all probability, almost exterminated; the provinces they formerly governed, inhabited by human beings scarce a degree above the brutes; every art and science lost; and the savage conquerors even in danger of starving for want of a sufficient knowledge of agriculture, having now no means of supplying themselves by plunder and robbery as before. Britain had long been abandoned to the mercy of the Scots and Picts; and in 450 the inhabitants had called in the Saxons to their assistance, whom they soon found worse enemies than those against whom they had implored their aid. Spain was held by the Goths and Suevians; Africa (that is, Barbary and Bildulgerid), by the Vandals; the Burgundians, Goths, Franks, and Alans, had erected several small states in Gaul; and Italy was subjected to the Heruli under Odoacer, who had taken upon him the title of *king of Italy*. In the east, indeed, matters wore an aspect somewhat more agreeable. The Roman empire continued to live in that of Constantinople, which was still very extensive. It comprehended all Asia Minor and Syria, as far as Persia; in Africa, the kingdom of Egypt; and Greece in Europe. The Persians were powerful, and rivalled the emperors of Constantinople; and beyond them lay the Indians, Chinese, and other nations, who, unheard of by the inhabitants of the more western parts, enjoyed peace and liberty.

The Constantinopolitan empire continued to decline by reason of its continual wars with the Persians, Bulgarians, and other barbarous nations; to which also superstition and relaxation of military discipline largely contributed. The Persian empire also declined from the same causes, together with the intestine broils from which it was seldom free more than that of Constantinople. The history of the eastern part of the world during this period, therefore, consists only of the wars between these two great empires, which we cannot here enter upon, and which were productive of no other consequence than that of weakening them both, and making them a more easy prey to those enemies who were now as it were in embryo, but shortly about to erect an empire almost as extensive as that of the Greeks or Romans.

Among the western nations, the revolutions, as might natu-

rally be expected from the character of the people, succeeded one another with rapidity. The Heruli under Odoacer were driven out by the Goths under Theodoric. The Goths were expelled by the Romans; and, while the two parties were contending, both were attacked by the Franks, who carried off an immense booty. The Romans were in their turn expelled by the Goths: the Franks again invaded Italy, and made themselves masters of the province of Venetia; but at last the superior fortune of the emperor of Constantinople prevailed, and the Goths were finally subdued in 553. Narfus, the conqueror of the Goths, governed Italy as a province of the eastern empire till the year 568, when Longinus his successor made considerable alterations. The Italian provinces had ever since the time of Constantine the Great been governed by *consulares*, *correctores*, and *presides*; no alteration having been made either by the Roman emperors or the Gothic kings. But Longinus, being invested with absolute power by Justinian, suppressed those magistrates; and, instead of them, placed in each city of note a governor, whom he distinguished with the title of *duke*. The city of Rome was not more honoured than any other; for Longinus, having abolished the very name of *senate* and *consuls*, appointed a *duke* of Rome as well as of other cities. To himself he assumed the title of *exarch*; and, residing at Ravenna, his government was styled the *exarchate of Ravenna*. But while he was establishing this new empire, the greatest part of Italy was conquered by the Lombards.

In France a considerable revolution also took place. In 487 Clovis, the founder of the late French monarchy, possessed himself of all the countries lying between the Rhine and the Loire. By force or treachery, he conquered all the petty kingdoms which had been erected in that country. His dominions had been divided, re-united, and divided again; and were on the point of being united a second time, when the great impostor Mahomet began to make a figure in the world.

In Spain, the Visigoths erected a kingdom ten years before the conquest of Rome by the Heruli. This kingdom they had extended eastward, about the same time that Clovis was extending his conquests to the west; so that the two kingdoms met at the river Loire. The consequence of this approach of such barbarous conquerors towards each other was an immediate war. Clovis proved victorious, and subdued great part of the country of the Visigoths, which put a final stop to their conquests on that side.

Another kingdom had been founded in the western parts of Spain by the Suevi, a considerable time before the Romans were finally expelled from that country. In 409 this kingdom was entirely subverted by Theodoric king of the Goths; and the Suevi were so pent up in a small district of Lusitania and Galicia, that it seemed impossible for them to recover themselves. During the above-mentioned period, however, while the attention of the Goths was turned another way, they had found means again to erect themselves into an independent state, and to become masters of considerably extended territories. But this success proved of short duration. In 584 the Goths attacked them; totally destroyed their empire a second time; and thus became masters of all Spain, except some small part which still owned subjection to the emperors of Constantinople. Of this part, however, the Goths became masters also in the year 623; which concludes the ninth general period.

Africa, properly so called, had changed its masters three times during this period. The Vandals had expelled the Romans, and erected an independent kingdom, which was at last overturned by the emperors of Constantinople; and from them the greatest part of it was taken by the Goths in 620.

10. At the commencement of the tenth general period (which begins with the flight of Mahomet in the year 622, from whence his followers date their era called the *Hegira*), we see every thing prepared for the great revolution which was now to take place: the Roman empire in the west annihilated; the Persian empire and that of Constantinople weakened by their mutual wars and intestine divisions; the Indians and other eastern nations unaccustomed to war, and ready to fall a prey to the first invader; the southern parts of Europe in a distracted and barbarous state; while the inhabitants of Arabia, from their earliest origin accustomed to war and plunder, and now united by the most violent superstition and enthusiastic desire of conquest, were like a flood pent up, and ready to overwhelm the rest of the world. The northern nations of Europe and Asia, however formidable in after times, were at present unknown, and peaceable, at least with respect to their southern neighbours; so that there was in no quarter of the globe any power capable of opposing the conquests of the Arabs. With amazing celerity, therefore, they over-ran all Syria, Palestine, Persia, Bukharia, and India, extending their conquests farther to the eastward than ever Alexander had done. On the west side, their empire extended over Egypt, Barbary, and Spain, together with the islands of Sicily, Sardinia, Majorca, Minorca, &c. and many of the Archipelago islands: nor were the coasts of Italy itself free from their incursions; nay, they are even said to have reached the distant and barren country of Iceland. At last this great empire, as well as others, began to decline. Its ruin was very sudden, and owing to its internal divisions. Mahomet had not taken care to establish the apostleship in his family, or to give any particular directions about a successor. The consequence of this was, that the caliphate, or succession to the apostleship, was seized by many usurpers in different parts of the empire; while the true caliphs, who resided at Bagdad, gradually lost all power, and were regarded only as a kind of high-priests. Of these divisions the Turks took advantage, to establish their authority in many provinces of the Mohammedan empire: but as they embraced the same religion with the Arabs, and were filled with the same enthusiastic desire of conquest, it is of little consequence to distinguish between them; as indeed it signified little to the world in general whether the Turks or Saracens were the conquerors, since both were cruel, barbarous, ignorant, and superstitious.

While the barbarians of the east were thus grasping at the empire of the whole world, great disturbances happened among the no less barbarous nations of the west. Superstition seems to have been the ruling motive in both cases. The Saracens and Turks conquered for the glory of God, or of his apostle Mahomet and his successors; the western nations professed an equal regard for the divine glory, but which was only to be perceived in the respect they paid to the pope and clergy. Ever since the establishment of Christianity by Constantine, the bishops of Rome had been gradually extending their power; and attempting not only to render themselves independent, but even to assume an authority over the emperors themselves. The destruction of the empire was so far from weakening their power, that it afforded them opportunities of greatly extending it, and becoming judges of the sovereigns of Italy themselves, whose barbarity and ignorance prompted them to submit to their decisions. All this time, however, they themselves had been in subjection to the emperors of Constantinople; but on the decline of that empire, they found means to get themselves exempted from this subjection. The principal authority in the city of Rome was then engrossed by the bishop; though of right it belonged to the duke appointed by the exarch of Ravenna. But though they had now little to fear from the eastern emperors, they were in great danger from the

ambition of the Lombards, who aimed at the conquest of all Italy. This aspiring people the bishops of Rome determined to check; and therefore, in 726, when Luitprand king of the Lombards had taken Ravenna and expelled the exarch, the pope undertook to restore him. For this purpose he applied to the Venetians, who are now first mentioned in history as a state of any consequence; and by their means the exarch was restored. Some time before, a quarrel had happened between the pope (Gregory II.) and Leo emperor of the east, about the worship of images. Leo, who it seems, in the midst of so much barbarism, had still preserved some share of common sense and reason, reprobated the worship of images in the strongest terms, and commanded them to be destroyed throughout his dominions. The pope, whose cause was favoured by the most absurd superstitions, and by these only, refused to obey the emperor's commands. The exarch of Ravenna, as a subject of the emperor, was ordered to force the pope to a compliance, and even to seize or assassinate him in case of a refusal. This excited the pious zeal of Luitprand to assist the pope, whom he had formerly designed to subdue: the exarch was first excommunicated, and then torn in pieces by the enraged multitude: the duke of Naples shared the same fate; and a vast number of the *Iconoclasts*, or Image-breakers, as they were called, were slaughtered without mercy: and to complete all, the subjects of the exarchate, at the instigation of the pope, renounced their allegiance to the emperor.

Leo was no sooner informed of this revolt than he ordered a powerful army to be raised, in order to reduce the rebels, and take vengeance on the pope. Alarmed at these warlike preparations, Gregory looked round for some power on which he might depend for protection. The Lombards were possessed of sufficient force, but they were too near and too dangerous neighbours to be trusted; the Venetians, though zealous Catholics, were as yet unable to withstand the force of the empire; Spain was over-run by the Saracens: the French seemed, therefore, the only people to whom it was adviseable to apply for aid; as they were able to oppose the emperor, and were likewise enemies to his edict. Charles Martel, who at that time governed France as mayor of the palace, was therefore applied to; but before a treaty could be concluded, all the parties concerned were removed by death. Constantine Copronymus, who succeeded Leo at Constantinople, not only persisted in the opposition to image-worship, begun by his predecessor, but prohibited also the invocation of saints. Zachary, who succeeded Gregory II. in the pontificate, proved as zealous an adversary as his predecessors. Pepin, who succeeded Charles Martel in the sovereignty of France, proved as powerful a friend to the pope as his father had been. The people of Rome had nothing to fear from Constantinople; and therefore drove out all the emperor's officers. The Lombards, awed by the power of France, for some time allowed the pope to govern in peace the dominions of the exarchate; but in 752, Astolphus king of Lombardy not only reduced the greatest part of the pope's territories, but threatened the city of Rome itself. Upon this an application was made to Pepin, who obliged Astolphus to restore the places he had taken, and gave them to the pope, or, as he said, to St. Peter. The Greek emperor, to whom they of right belonged, remonstrated to no purpose. The pope from that time became possessed of considerable territories in Italy; which, from the manner of their donation, go under the name of *St. Peter's Patrimony*. It was not, however, before the year 774 that the pope was fully secured in these new dominions. This was accomplished when the kingdom of the Lombards was totally destroyed by Charlemagne, who was thereupon crowned king of Italy. Soon after, this monarch made himself master of all the Low Countries, Germany, and part of Hungary; and in

the year 800, was solemnly crowned emperor of the west by the pope.

Thus was the world once more shared among three great empires. The empire of the Arabs or Saracens extended from the river Ganges to Spain; comprehending almost all of Asia and Africa which has ever been known to Europeans, the kingdoms of China and Japan excepted. The eastern Roman empire was reduced to Greece, Asia Minor, and the provinces adjoining to Italy. The empire of the west under Charlemagne, comprehended France, Germany, and the greatest part of Italy. The Saxons, however, as yet possessed Britain unmolested by external enemies, though the seven kingdoms erected by them were engaged in perpetual contests. The Venetians also enjoyed a nominal liberty; though it is probable that their situation would render them very much dependent on the great powers which surrounded them. Of all nations on earth, the Scots and Picts, and the remote ones of China and Japan, seem to have enjoyed, from their situation, the greatest share of liberty; unless, perhaps, we except the Scandinavians, who, under the names of *Danes* and *Normans*, were soon to infest their southern neighbours. But of all the European potentates, the popes certainly exercised the greatest authority; since even Charlemagne himself submitted to accept the crown from their hands, and his successors made them the arbiters of their differences.

Matters, however, did not long continue in this state. The empire of Charlemagne was on the death of his son Lewis divided among his three children. Endless disputes and wars ensued among them, till at last the sovereign power was seized by Hugh Capet in 987. The Saxon heptarchy was dissolved in 827, and the whole kingdom of England reduced under one head. The Danes and Normans began to make depredations, and infest the neighbouring states. The former conquered the English Saxons, and seized the government, but were in their turn expelled by the Normans in 1066. In Germany and Italy the greatest disturbances arose from the contests between the popes and the emperors. To all this if we add the internal contests which happened through the ambition of the powerful barons of every kingdom, we can scarce form an idea of times more calamitous than those of which we now treat. All Europe, nay, all the world, was one great field of battle; for the empire of the Mahometans was not in a more settled state than that of the Europeans. Caliphs, sultans, emirs, &c. waged continual war with each other in every quarter; new sovereignties every day sprung up, and were as quickly destroyed. In short, through the ignorance and barbarity with which the whole world was overspread, it seemed in a manner impossible that the human race could long continue to exist; when happily the crusades, by directing the attention of the Europeans to one particular object, made them in some measure suspend their slaughters of one another.

11. The crusades originated from the superstition of the two grand parties into which the world was at that time divided, namely, the Christians and Mahometans. Both looked upon the small territory of Palestine, which they called the *Holy Land*, to be an invaluable acquisition, for which no sum of money could be an equivalent; and both took the most unjustifiable methods to accomplish their desires. The superstition of Omar the second caliph had prompted him to invade this country, part of the territories of the Greek emperor, who was doing him no hurt; and now when it had been so long under the subjection of the Mahometans, a similar superstition prompted the pope to send an army for the recovery of it. The crusaders accordingly poured forth in multitudes, like those with which the kings of Persia formerly invaded Greece; and their fate was pretty similar. Their impetuous valour at first, indeed, carried every thing before them: they recovered

all Palestine, Phœnicia, and part of Syria, from the infidels; but their want of conduct soon lost what their valour had obtained, and very few of that vast multitude which had left Europe ever returned to their native countries. A second, a third, and several other crusades, were preached, and were attended with a like success in both respects: vast numbers took the cross, and repaired to the Holy Land; which they polluted by the most abominable massacres and treacheries, and from which very few of them returned. In the third crusade Richard I. of England was embarked, who seems to have been the best general that ever went into the east; but even his valour and skill were not sufficient to repair the faults of his companions; and he was obliged to return even after he had entirely defeated his antagonists, and was within sight of Jerusalem.

But while the Christians and Mahometans were thus superstitiously contending for a small territory in the western parts of Asia, the nations in the more easterly parts were threatened with total extermination. Jenghiz Khan, the greatest as well as the most bloody conqueror that ever existed, now makes his appearance. The rapidity of his conquests seemed to emulate those of Alexander the Great; and the cruelties he committed were altogether unparalleled. It is worth observing, that Jenghiz Khan and all his followers were neither Christians nor Mahometans, but strict Deists. For a long time even the sovereign had not heard of a temple, or any particular place on earth appropriated by the Deity to himself, and treated the notion with ridicule when it was first mentioned to him.

The Moguls, over whom Jenghiz Khan assumed the sovereignty, were a people of East Tartary, divided into a great number of petty governments as they are at this day, but who owned a subjection to one sovereign, whom they called *Vang-Khan*, or the Great Khan. Temujin, afterwards *Jenghiz-Khan*, was one of these petty princes; but unjustly deprived of the greatest part of his inheritance at the age of 13, which he could not recover till he arrived at that of 40. This corresponds with the year 1201, when he totally reduced the rebels; and, as a specimen of his lenity, caused 70 of their chiefs to be thrown into as many caldrons of boiling water. In 1202 he defeated and killed Vang-khan himself (known to the Europeans by the name of *Prester John of Asia*); and possessing himself of his vast dominions, became from thenceforward altogether irresistible. In 1206, having still continued to enlarge his dominions, he was declared khan of the Moguls and Tartars; and took upon him the title of *Jenghiz Khan*, or *The most great Khan of khans*. This was followed by the reduction of the kingdom of Hya in China, Tangut, Kitay, Turkestan, Karazm (the kingdom of *GAZNA* founded by Mahmud Gazni), Great Bukharia, Persia, and part of India, and all these vast regions were reduced in 26 years. The devastations and slaughters with which they were accompanied are unparalleled, no fewer than 14,470,000 persons being computed to have been massacred by Jenghiz Khan during the last 22 years of his reign. In the beginning of 1227 he died, thereby freeing the world from a most bloody tyrant. His successors completed the conquest of China and Korea; but were foiled in their attempts on Cochinchina, Tong-king, and Japan. On the western side the Tartar dominions were not much enlarged till the time of Hulaku, who conquered Media, Babylonia, Mesopotamia, Assyria, Syria, Georgia, Armenia, and almost all Asia Minor; putting an end to the empire of the Saracens by the taking of Bagdad in 1258.

The empire of Jenghiz Khan had the fate of all others. Being far too extensive to be governed by one head, it split into a multitude of small kingdoms, as it had been before his time. All these princes, however, owned allegiance to the family of Jenghiz Khan till the time of Timur Bek, or Tamer-

lane. The Turks, in the mean time, urged forward by the inundation of Tartars who poured in from the east, were forced upon the remains of the Greek empire; and at the time of Tamerlane above-mentioned, they had almost confined this once mighty empire within the walls of Constantinople.

In the year 1335, the family of Jenghiz Khan becoming extinct in Persia, a long civil war ensued; during which Timur Bek, one of the petty princes among which the Tartar dominions were divided, found means to aggrandize himself in a manner similar to what Jenghiz Khan had done about 150 years before. Jenghiz Khan, indeed, was the model whom he proposed to imitate; but it must be allowed that Timur was more merciful than Jenghiz Khan, if indeed the word can be applied to such inhuman tyrants. The plan on which Jenghiz Khan conducted his expeditions was that of total extermination. For some time he utterly extirpated the inhabitants of those places which he conquered, designing to people them anew with his Moguls; and in consequence of this resolution, he would employ his army in beheading 100,000 prisoners at once. Timur's cruelty, on the other hand, seldom went farther than the pounding of 3000 or 4000 people in large mortars, or building them among bricks and mortar into a wall. We must observe, however, that Timur was not a Deist, but a Mahometan, and conquered expressly for the purpose of spreading the Mahometan religion; for the Moguls had now adopted all the superstitions and absurdities of Mahomet. Thus was all the eastern quarter of the world threatened anew with the most dreadful devastations, while the western nations were exhausting themselves in fruitless attempts to regain the Holy Land. The Turks were the only people who seem at this period to have been gathering strength, and by their perpetual encroachments threatened to swallow up the western nations as the Tartars had done the eastern ones.

In 1362 Timur invaded Bukharia, which he reduced in five years. He proceeded in his conquests, though not with the same celerity as Jenghiz Khan, till the year 1387, when he had subdued all Persia, Armenia, Georgia, Karazm, and great part of Tartary. After this he proceeded westward, subduing all the countries to the Euphrates; made himself master of Bagdad; and even entered Russia, where he pillaged the city of Moscow. From thence he turned his arms to the east, and totally subdued India. In 1393 he invaded and reduced Syria; and having turned his arms against the Turks, forced their sultan Bajazet to raise the siege of Constantinople. This brought on an engagement, in which Bajazet was entirely defeated and taken prisoner; which broke the power of the Turks to such a degree, that they were not for some time able to recover themselves. At last this great conqueror died in the year 1405, while on his way to conquer China, as Jenghiz Khan had done before him.

The death of Timur was followed almost immediately by the dissolution of his empire. Most of the nations he had conquered recovered their liberty. The Turks had now no further obstacle to their conquest of Constantinople. The western nations having exhausted themselves in the *holy wars*, as they were called, had lost that insatiable thirst after conquest which for so long time possessed the minds of men. They had already made considerable advances in civilization, and began to study the arts of peace. Gunpowder was invented, and its application to the purposes of war already known; and, though no invention threatened to be more destructive, perhaps none was ever more beneficial to the human race. By the use of fire-arms, nations are put more on a level with each other than formerly they were; war is reduced to a regular system, which may be studied with as much success as any other science. Conquests are not now to be made with the same ease as formerly; and hence the last ages of the world have

been much more quiet and peaceable than the former ones. In 1453 the conquest of Constantinople by the Turks fixed that wandering people to one place; and though now they possess very large regions both in Europe, Asia, and Africa, an effectual stop hath long been put to their further progress.

About this time, also, learning began to revive in Europe, where it had been long lost; and the invention of PRINTING, which happened about the same time, rendered it in a manner impossible for barbarism ever to take place in such a degree as formerly. All nations of the world, indeed, seem now at once to have laid aside much of their former ferocity; and, though wars have by no means been uncommon, they have not been carried on with such circumstances of fury and savage cruelty as before. Instead of attempting to enrich themselves by plunder, and the spoils of their neighbours, mankind in general have applied themselves to commerce, the only true and durable source of riches. This soon produced improvements in navigation; and these improvements led to the discovery of many regions formerly unknown. At the same time, the European powers, being at last thoroughly sensible that extensive conquests could never be permanent, applied themselves more to provide for the security of those dominions which they already possessed, than to attempt the conquest of one another: and this produced the policy to which so much attention was lately paid, namely, the *preserving of the balance of Europe*; that is, preventing any one of the nations from acquiring sufficient strength to overpower another.

In the end of the 15th century, the vast continent of America was discovered; and, almost at the same time, the passage to the East Indies by the Cape of Good-Hope. The discovery of these rich countries gave a new turn to the ambition of the Europeans. To enrich themselves, either by the gold and silver produced in these countries, or by traffic with the natives, now became the object. The Portuguese had the advantage of being the first discoverers of the eastern, and the Spaniards of the western countries. The former did not neglect so favourable an opportunity of enriching themselves by commerce. Many settlements were formed by them in the East-India islands, and on the continent; but their avarice and perfidious behaviour towards the natives proved at last the cause of their total expulsion. The Spaniards enriched themselves by the vast quantities of the precious metals imported from America, which were not obtained but by the most horrid massacres committed on the natives, and of which history gives an account under the different names of the American countries. These possessions of the Spaniards and Portuguese soon excited other European nations to make attempts to share with them in their treasures, by planting colonies in different parts of America, and making settlements in the East-Indies: and thus has the rage of war in some measure been transferred from Europe to these distant regions; and, after various contests, the British at last obtained a great superiority both in America and the East-Indies.

In Europe the only considerable revolutions which happened during this period, were, The total expulsion of the Moors and Saracens from Spain, by the taking of Grenada in 1491; the union of the kingdoms of Arragon and Castile, by the marriage of Ferdinand and Isabella; and the revolt of the states of Holland from the Spaniards. After much contention and bloodshed, these last obtained their liberty, and were declared a free people in 1609; since which time they have continued an independent and very considerable nation of Europe.

In Asia nothing of importance hath happened since the taking of Constantinople by the Turks. That continent is now divided among the following nations. The most northerly part, called *Siberia*, extending to the very extremity of the con-

continent, is under the power of Russia. To the southward, from Asia Minor to China and Korea, are the Tartars, formidable indeed from their numbers, but, by reason of their barbarity and want of union, incapable of attempting any thing. The Turks possess the western part of the continent called *Asia Minor*, to the river Euphrates. The Arabs are again confined within their own peninsula; which they possess, as they have ever done, without owing subjection to any foreign power. To the east of Turkey in Asia lies Persia, now more confined in its limits than before; and to the eastward of Persia lies India, or the kingdom late of the Mogul, comprehending all the country from the Indus to the Ganges, and beyond that river. Still farther to the east lie the kingdoms of Siam, Pegu, Thibet, and Cochin-China, little known to the Europeans. The vast empire of China occupies the most easterly part of the continent; while that of Japan comprehends the islands which go by that name, and which are supposed to lie at no great distance from the western coasts of America.

In Africa the Turks possess Egypt, which they conquered in 1517, and have a nominal jurisdiction over the states of Barbary. The interior parts are filled with barbarous and unknown nations, as they have always been. On the western coasts are many settlements of the European nations, particularly the British and Portuguese; and the southern extremity is possessed by the Dutch. The eastern coasts are almost totally unknown. The Asiatic and African islands are either possessed by the Europeans, or inhabited by savage nations.

The European nations at the beginning of the 17th century were, Sweden, Muscovy, Denmark, Poland, Britain, Germany, Holland, France, Spain, Portugal, Italy, and Turkey in Europe. Of these the Russians, though the most barbarous, were by far the most considerable, both in regard to numbers and the extent of their empire; but their situation made them little feared by the others, who lay at a distance from them. The kingdom of Poland, which was first set up in the year 1000, proved a barrier betwixt Russia and Germany; and at the same time the policy above mentioned, of keeping up the balance of power in Europe, rendered it probable that no one European nation, whatever wars it might be engaged in, would have been totally destroyed, or ceased to exist as a distinct kingdom. The late dismemberment of Poland, however, or its partition between the three powers Russia, Hungary, and Prussia, was a step very inconsistent with the above political system; and it is surprising with what tameness it was acquiesced in by the other powers. Subsequent circumstances, particularly the passiveness with which the ambitious designs of Russia against the Porte have been so long beheld, seem to indicate a total dereliction of that scheme of equilibrium, formerly so wisely, though perhaps sometimes too anxiously, attended to.

The revolt of the British colonies in America, it was hoped by the enemies of Britain, would have given a fatal shock to her strength and wonted superiority. The consequences, however, have been very different. Those colonies, it is true, have been disjoined from the mother-country, and have attained an independent rank among the nations. But Britain has had no cause to repine at the separation. Divested only of a splendid encumbrance, an expensive and invidious appanage, she has been left to enjoy the undivided benefits of her native vigour, and to display new energies, which, but for the present devastating and expensive war, of which the termination and consequences cannot at present even be conjectured, seemed to promise her mild empire a long and prosperous duration. On the other hand, the flame which was to have blazed only to her prejudice, has entailed a lengthened ruin on her chief foe. The French, indeed, by the establishment of their Republic, have become a nation of freemen as well as ourselves, and as well as the Americans; who, by the way, as some think,

were never otherwise, nor ever knew what oppression was. But neither is the French revolution an event which Britons, as lovers of liberty and friends to the rights of mankind, should regret; or which, even in a political view, if duly considered, ought to excite either their jealousy or apprehension. In fine, we seem to be advancing to a great era in the history of human affairs. The emancipation of France, it is highly probable, notwithstanding the address which the Directory have manifested in making Spain take part against us in the war, will in time be followed by a revolution in the latter; and perhaps also in some other countries of Europe. The papal power too, that scourge of nations, has suffered a fatal blow; and the period seems to be approaching when the Roman pontiff will be reduced to nothing. More liberal ideas both in politics and religion are every where gaining ground. The regulation, and perhaps in time the abolition, of the slave-trade, with the endeavours of the societies for fertilizing Africa, may lead to the civilization of some parts of that immense continent, and open new markets for our manufactures.

CH A P. II.

Of ECCLESIASTICAL HISTORY.

THE history of religion, among all the different nations that have existed in the world, is a subject no less important and interesting than that of civil history. It is, however, less fertile of great events, affords an account of fewer revolutions, and is much more uniform, than civil history. The reason of this is plain. Religion is conversant about things which cannot be seen; and which of consequence cannot suddenly and strongly affect the senses of mankind, as natural things are apt to do. The expectation of worldly riches can easily induce one nation to attack another; but it is not easy to find any thing which will induce a nation to change its religion. The invisible nature of spiritual things, the prejudice of habit and of early education, all stand in the way of changes of this kind. Hence the revolutions in religion have been but few, and the duration of almost any religion of longer standing than the most celebrated empires; the changes which have happened, in general have acquired a long time to bring them about, and history scarce affords an instance of the religion of any nation being essentially and suddenly changed for another.

With regard to the origin of religion, we must have recourse to the Scriptures; and are as necessarily constrained to adopt the account there given, as we are to adopt that of the creation given in the same book; namely, because no other hath made its appearance which seems in any degree rational, or consistent with itself. In what manner the true religion given to Adam was falsified or corrupted by his descendants before the flood, doth not clearly appear from Scripture. Idolatry is not mentioned: nevertheless we are assured that the inhabitants of the world were then exceedingly wicked; and as their wickedness did not consist in worshipping false gods, it may be concluded that they worshipped none at all: i. e. that the crime of the antediluvians was a species of atheism.

After the flood, idolatry quickly made its appearance; but what gave rise to it is not certainly known. This superstition indeed seems to be natural to man, especially when placed in such a situation that he hath little opportunity of instruction, or of improving his rational faculties. This seems also probable from a caution given to the Jews, lest, when they looked up to the sun, moon, and stars, and the rest of the host of heaven, they should be *driven to worship them*. The origin of idolatry among the Syrians and Arabians, and also in Greece, is therefore accounted for with great probability in the following manner by the author of *The Ruins of Balbec*. "In those uncomfortable deserts, where the day presents nothing to the view but the uniform, tedious, and melancholy prospect of barren

sands, the night discloses a most delightful and magnificent spectacle, and appears arrayed with charms of the most attractive kind. For the most part unclouded and serene, it exhibits to the wondering eye the host of heaven in all their variety and glory. In the view of this stupendous scene, the transition from admiration to idolatry was too easy to uninstructed minds; and a people whose climate offered no beauties to contemplate but those of the firmament, would naturally look thither for the objects of their worship. The form of idolatry in Greece was different from that of the Syrians; which perhaps may be attributed to that smiling and variegated scene of mountains, valleys, rivers, woods, groves, and fountains, which the transported imagination, in the midst of its pleasing astonishment, supposed to be the seats of invisible deities."

A difficulty, however, arises on this supposition; for if idolatry is naturally produced in the mind of uninstructed and savage man from a view of the creation, why hath not idolatry of some kind or other taken place among all the different nations of the world? This certainly hath not been the case; of which the most striking examples are the Persians of old, and the Moguls in more modern times. Both these nations were strict deists: so that we must allow some other causes to concur in producing idolatry besides these already mentioned; and of these causes an imperfect and obscure notion of the true religion seems to be the most probable.

Though idolatry, therefore, was formerly very prevalent, it neither extended over the whole earth, nor were the superstitions of the idolaters all of one kind. Every nation had its respective gods, over which one more excellent than the rest was said to preside; yet in such a manner, that this supreme deity himself was controuled by the rigid empire of the fates, or by what philosophers called *eternal necessity*. The gods of the east were different from those of the Gauls, the Germans, and the other northern nations. The Grecian divinities differed widely from those of the Egyptians, who deified plants, animals, and a great variety of the productions both of nature and art. Each people also had their own particular manner of worshipping and appeasing their respective deities, entirely different from the sacred rites of other countries. All this variety of religions, however, produced neither wars nor dissensions among the different nations; each nation suffered its neighbours to follow their own method of worship, without discovering any displeasure on that account. There is nothing surprising in this mutual toleration, when we consider, that they all looked upon the world as one great empire, divided into various provinces, over each of which a certain order of divinities presided; for which reason they imagined that none could behold with contempt the gods of other nations, or force strangers to pay homage to theirs. The Romans exercised this toleration in the most ample manner; for though they would not allow any change to be made in the religions that were publicly professed in the empire, nor any new form of worship to be openly introduced, yet they granted to their citizens a full liberty of observing in private the sacred rites of other nations, and of honouring foreign deities as they thought proper.

The heathen deities were honoured with rites and sacrifices of various kinds, according to their respective natures and offices. Their rites were absurd and ridiculous; while the priests, appointed to preside over this strange worship, abused their authority, by deceiving and imposing upon the people in the grossest manner.

From the time of the flood to the coming of Christ, idolatry prevailed among almost all the nations of the world, the Jews alone excepted; and even they were on all occasions ready to run into it, as is evident from their history in the Old Testament. At the time of Christ's appearance, the religion of the Romans, as well as their empire, extended over a great part of

the world. Some people there were among the heathens who perceived the absurdities of that system; but being destitute of means, as well as of abilities, to effect a reformation, matters went on in their old way. Though there were at that time various sects of philosophers, yet all of them proceeded upon false principles, and consequently could be of no service to the advancement or reformation of religion. Nay, some, among whom were the Epicureans and Academics, declared openly against every kind of religion whatever.

Two religions at this time flourished in Palestine, viz. The Jewish and Samaritan; between whose respective followers reigned the most violent hatred and contempt. The difference between them seems to have been chiefly about the place of worship; which the Jews would have to be in Jerusalem, and the Samaritans on mount Gerizzim. But though the Jews were certainly right as to this point, they had greatly corrupted their religion in other respects. They expected a Saviour indeed, but they mistook his character; imagining that he was to be a powerful and warlike prince, who should set them free from the Roman yoke, which they bore with the utmost impatience. They also imagined that the whole of religion consisted in observing the rites of Moses, and some others which they had added to them, without the least regard to what is commonly called *mortality* or *virtue*; as is evident from the many charges our Saviour brings against the Pharisees, who had the greatest reputation for sanctity among the whole nation. To these corrupt and vicious principles they added several absurd and superstitious notions concerning the divine nature, invisible powers, magic, &c. which they had partly imbibed during the Babylonian captivity, and partly derived from their neighbours in Arabia, Syria, and Egypt. The principal sects among them were the *ESSENES* or *Essenians*, *PHARISEES*, and *SADDUCEES*. The Samaritans, according to the most general opinion, had corrupted their religion still more than the Jews.

When the true religion was preached by the Saviour of mankind, it is not to be wondered at if he became on that account obnoxious to a people so deeply sunk in corruption and ignorance as the Jews then were. It is not here requisite to enter into the particulars of the doctrine advanced by him, or of the opposition he met with from the Jews; as a full account of these things, and likewise of the preaching of the gospel by the Apostles, may be found in the New Testament. The rapid progress of the Christian religion, under these faithful and inspired ministers, soon alarmed the Jews, and raised various persecutions against its followers. The Jews, indeed, seem at first to have been every where the chief promoters of persecution; for we find that they officiously went from place to place, wherever they heard of the increase of the gospel, and by their calumnies and false suggestions endeavoured to stir up the people against the Apostles. The Heathens, however, though at first they showed no very violent spirit of persecution against the Christians, soon came to hate them as much as the Jews themselves. Tacitus acquaints us with the causes of this hatred, when speaking of the first general persecution under Nero. That inhuman emperor having, as was supposed, set fire to the city of Rome, to avoid the imputation of this wickedness, transferred it on the Christians. Our author informs us, that they were already abhorred on account of their many and enormous crimes. "The author of this name (*Christians*)," says he, "was CHRIST, who, in the reign of Tiberius, was executed under Pontius Pilate, procurator of Judaea. The pestilent superstition was for a while suppressed: but it revived again, and spread, not only over Judaea, where this evil was first broached, but reached Rome, whither from every quarter of the earth is constantly flowing whatever is hideous and abominable amongst men, and is there readily embraced and practised. First, therefore, were apprehended such as openly avowed themselves to be

of that sect; then by them were discovered an immense multitude; and all were convicted, not of the crime of burning Rome, but of hatred and enmity to mankind. Their death and tortures were aggravated by cruel derision and sport; for they were either covered with the skins of wild beasts and torn in pieces by devouring dogs, or fastened to crosses, or wrapped up in combustible garments, that, when the day-light failed, they might, like torches, serve to dispel the darkness of the night. Hence, towards the miserable sufferers, however guilty and deserving the most exemplary punishment, compassion arose; seeing they were doomed to perish, not with a view to the public good, but to gratify the cruelty of one man."

That this account of Tacitus is downright misrepresentation and calumny, must be evident to every one who reads it. It is impossible that any person can be convicted of hatred and enmity to mankind, without specifying a number of facts by which this hatred shewed itself. The burning of Rome would indeed have been a very plain indication of enmity to mankind; but of this Tacitus himself clears them, and mentions no other crime of which they were guilty. It is probable, therefore, that the only reason of this charge against the Christians, was their absolute refusal to have any share in the Roman worship, or to countenance the absurd superstitions of Paganism in any degree.

The persecution under Nero was succeeded by another under Domitian; during which the apostle John was banished to Patmos, where he saw the visions, and wrote the book called *his Revelations*, which completes the canon of Scripture. This persecution commenced in the 95th year of the Christian era; and John is supposed to have written his Revelation the year after, or in the following one.

During the *first century*, the Christian religion spread over a great number of different countries; but as we have now no authentic records concerning the travels of the apostles, or the success which attended them in their ministry, it is impossible to determine how far the gospel was carried during this period. We are, however, assured, that even during this early period many corruptions were creeping in, the progress of which was with difficulty prevented even by the apostles themselves. Some corrupted their profession by a mixture of Judaism; others by mixing it with the oriental philosophy; while others were already attempting to deprive their brethren of liberty, setting themselves up as eminent pastors, in opposition even to the apostles, as we learn from the epistles of St. Paul, and the third epistle of St. John. Hence arose the sects of the Gnostics, Cerinthians, Nicolaitans, Nazarenes, Ebionites, &c. with which the church was agitated during this century.

Concerning the ceremonies and method of worship used by the Christians of the first century, it is impossible to say any thing with certainty. Neither is the church order, government, and discipline, during this period, ascertained with any degree of exactness. Each of those parties, therefore, which exist at this day, contends with the greatest earnestness for that particular mode of worship which they themselves have adopted; and some of the most bigoted would willingly monopolize the word *church* in such a manner as to exclude from all hope of salvation every one who is not attached to their particular party. It doth not however appear that, excepting baptism, the Lord's supper, and anointing the sick with oil, any external ceremonies or symbols were properly of divine appointment. According to Dr. Mosheim, "there are several circumstances which incline us to think, that the friends and apostles of our blessed Lord either tolerated through necessity, or appointed for wise reasons, many other external rites in various places. At the same time, we are not to imagine, that they ever conferred upon any person a perpetual, indelible, pontifical authority, or that they enjoined the same rites in all churches. We learn, on the contrary, from authentic records, that the Christian worship

was from the beginning celebrated in a different manner in different places; and that, no doubt, by the orders, or at least with the approbation, of the apostles and their disciples. In those early times, it was both wise and necessary to shew, in the establishment of outward forms of worship, some indulgence to the ancient opinions, manners and laws of the respective nations to whom the gospel was preached."

The *second century* commences with the third year of the emperor Trajan. The Christians were still persecuted; but as the Roman emperors were for the most part of this century princes of a mild and moderate turn, they persecuted less violently than formerly. Marcus Aurelius, notwithstanding the clemency and philosophy for which he is so much celebrated, treated the Christians worse than Trajan, Adrian, or even Severus himself did, who was noted for his cruelty. This respite from rigorous persecution proved a very favourable circumstance for the spreading of the Christian religion; yet it is by no means easy to point out the particular countries through which it was diffused. We are, however, assured, that in the second century, Christ was worshipped as God almost through the whole east; as also among the Germans, Spaniards, Celtes, and many other nations: but which of them received the gospel in the first century, and which in the second, is a question unanswerable at this distance of time. The writers of this century attribute the rapid progress of Christianity chiefly to the extraordinary gifts that were imparted to the first Christians, and the miracles which were wrought at their command; without supposing that any part of the success ought to be ascribed to the intervention of human means, or secondary causes. Many of the moderns, however, are so far from being of this opinion, that they are willing either to deny the authenticity of all miracles said to have been wrought since the days of the apostles, or to ascribe them to the power of the devil. To enter into the particulars of this controversy is foreign to our present purpose; for which reason we must refer to the writers of polemic divinity, who have largely treated of this and other points of a similar nature.

The corruptions which had been introduced in the first century, and which were almost coeval with Christianity itself, continued to gain ground in the second. Ceremonies, in themselves futile and useless, but which must be considered as highly pernicious when joined to a religion incapable of any other ornament than the upright and virtuous conduct of its professors, were multiplied for no other purpose than to please the ignorant multitude. The immediate consequence of this was, that the attention of Christians was drawn aside from the important duties of morality; and they were led to imagine, that a careful observance of the ceremonies might make amends for the neglect of moral duties. This was the most pernicious opinion that could possibly be entertained; and was indeed the very foundation of that enormous system of ecclesiastical power which afterwards took place, and held the whole world in slavery and barbarism for many ages.

Another mischief was the introduction of *mysteries*, as they were called, into the Christian religion; that is, insinuating that some parts of the worship in common use had a hidden efficacy and power far superior to the plain and obvious meaning assigned to them by the vulgar: and by paying peculiar respect to these mysteries, the pretended teachers of the religion of Jesus accommodated their doctrines to the taste of their heathen neighbours, whose religion consisted in a heap of mysteries, of which nobody knew the meaning.

By these, and other means of a similar kind, the Christian pastors greatly abridged the liberty of their flock. Being masters of the ceremonies and mysteries of the Christian religion, they had it in their power to make their followers worship and believe whatever they thought proper; and this they did not fail to make use of for their own advantage. They persuaded

the people, that the ministers of the Christian church succeeded to the character, rights, and privileges, of the Jewish priesthood; and accordingly the bishops considered themselves as invested with a rank and character similar to those of the high-priest among the Jews, while the presbyters represented the priests, and the deacons the Levites. This notion, which was first introduced in the reign of Adrian, proved a source of very considerable honour and profit to the clergy.

The form of ecclesiastical government was in this century rendered permanent and uniform. One inspector or bishop presided over each Christian assembly, to which office he was elected by the voices of the whole people. To assist him in his office, he formed a council of presbyters, which was not confined to any stated number. To the bishops and presbyters the ministers or *deacons* were subject; and the latter were divided into a variety of classes, as the different exigencies of the church required. During a great part of this century, the churches were independent of each other; nor were they joined together by association, confederacy, or any other bonds but those of charity. Each assembly was a little state governed by its own laws; which were either enacted, or at least approved of, by the society. But in process of time all the Christian churches of a province were formed into one large ecclesiastical body, which, like confederate states, assembled at certain times, in order to deliberate about the common interests of the whole. This institution had its origin among the Greeks; but in a short time it became universal, and similar assemblies were formed in all places where the gospel had been planted. These assemblies, which consisted of the deputies or commissioners from several churches, were called *synods* by the Greeks, and *councils* by the Latins; and the laws enacted in these general meetings were called *canons*, i. e. *rules*.

These councils, of which we find not the smallest trace before the middle of this century, changed the whole face of the church, and gave it a new form; for by them the ancient privileges of the people were considerably diminished, and the power and authority of the bishops greatly augmented. The humility, indeed, and prudence, of these pious prelates hindered them from assuming all at once the power with which they were afterwards invested. At their first appearance in these general councils, they acknowledged that they were no more than the delegates of their respective churches, and that they acted in the name and by the appointment of their people. But they soon changed this humble tone; imperceptibly extended the limits of their authority; turned their influence into dominion, their counsels into laws; and at length openly asserted, that Christ had empowered them to prescribe to his people *authoritative rules of faith and manners*. Another effect of these councils was the gradual abolition of that perfect equality which reigned among all bishops in the primitive times: for the order and decency of these assemblies required, that some one of the provincial bishops met in council should be invested with a superior degree of power and authority; and hence the rights of Metropolitans derive their origin. In the mean time, the bounds of the church were enlarged; the custom of holding councils was followed wherever the sound of the gospel had reached; and the universal church had now the appearance of one vast republic formed by a combination of a great number of little states. This occasioned the creation of a new order of ecclesiastics, who were appointed in different parts of the world as heads of the church, and whose office it was to preserve the consistence and union of that immense body, whose members were so widely dispersed throughout the nations. Such was the nature and office of the *Patriarchs*; among whom, at length, ambition, being arrived at its most insolent period, formed a new dignity, investing the bishop of Rome with the title and authority of the *Prince of the Patriarchs*.

During the second century, all the sects continued which had sprung up in the first, with the addition of several others; the most remarkable of which were the *Ascetics*. These owed their rise to an error propagated by some doctors of the church, who asserted that Christ had established a *double rule of sanctity and virtue* for two different orders of Christians. Of these rules, one was ordinary, the other extraordinary; the one of a lower dignity, the other more sublime: the first for persons in the active scenes of life; the other for those who, in a sacred retreat, aspired after the glory of a celestial state. In consequence of this system, they divided into two parts all those moral doctrines and instructions which they had received either by writing or tradition. One of these divisions they called *precepts*, and the other *counsels*. They gave the name of *precepts* to those laws that were universally obligatory upon all orders of men; and that of *counsels* to those which related to Christians of a more sublime rank, who proposed to themselves great and glorious ends, and breathed after an intimate communion with the Supreme Being. Thus were produced all at once a new set of men, who made pretensions to uncommon sanctity and virtue, and declared their resolution of obeying all the *precepts* and *counsels* of Christ, in order to their enjoyment of communion with God here, and also that, after the dissolution of their mortal bodies, they might ascend to him with the greater facility, and find nothing to retard their approach to the centre of happiness and perfection. They looked upon themselves as prohibited from the use of things which it was lawful for other Christians to enjoy; such as wine, flesh, matrimony, and commerce. They thought it their indispensable duty to extenuate their body by watchings, abstinence, labour, and hunger. They looked for felicity in solitary retreats, and desert places; where, by severe and assiduous efforts of sublime meditation, they raised the soul above all external objects, and all sensual pleasures. They were distinguished from other Christians, not only by their title of *Ascetics*, *Σπυδαῖοι*, *Εκλεκτοί*, and philosophers, but also by their garb. In this century, indeed, those who embraced such an austere kind of life, submitted themselves to all these mortifications in private, without breaking asunder their social bands, or withdrawing themselves from mankind; but in process of time they retired into deserts, and, after the example of the Essenes and Therapeutæ, they formed themselves into select companies.

This austere sect arose from an opinion which has been more or less prevalent in all ages and in all countries, namely, that religion consists more in prayers, meditations, and a kind of secret intercourse with God, than in fulfilling the social duties of life in acts of benevolence and humanity to mankind. Nothing can be more evident than that the Scripture reckons the fulfilling of these infinitely superior to the observance of all the ceremonies that can be imagined: yet it somehow or other happens, that almost every body is more inclined to observe the ceremonial part of devotion than the moral; and hence, according to the different humours or constitutions of different persons, there have been numberless forms of Christianity, and the most virulent contentions among those who professed themselves followers of the Prince of Peace. It is obvious, that if the moral conduct of Christians was to be made the standard of faith, instead of speculative opinions, all these divisions must cease in a moment; but while Christianity, or any part of it, is made to consist in speculation, or the observance of ceremonies, it is impossible there can be any end of sects or heresies. No opinion whatever is so absurd, but some people have pretended to argue in its defence; and no ceremony so insignificant, but it hath been explained and sanctified by hot-headed enthusiasts: and hence ceremonies, sects, and absurdities, have been multiplied without number, to the prejudice of society and of the Christian religion. This short relation of the rise of the Ascetic sect will also serve to

account for the rise of any other; so that we apprehend it is needless to enter into particulars concerning the rest, as they all took their origin from the same general principle variously modified, according to the different dispositions of mankind.

The Ascetic sect began first in Egypt, from whence it passed into Syria and the neighbouring countries. At length it reached the European nations: and hence that train of austere and superstitious vows and rites which totally obscured, or almost annihilated, Christianity; the celibacy of the clergy, and many other absurdities of the like kind. The errors of the Ascetics, however, did not stop here: In compliance with the doctrines of some Pagan philosophers, they affirmed, that it was not only lawful, but even praise-worthy, to deceive, and to use the expedient of a lie, in order to advance the cause of piety and truth; and hence the *pious frauds* for which the church of Rome hath been so notorious, and with which she hath been so often and justly reproached.

As Christians thus deviated more and more from the true practice of their religion, they became more zealous in the external profession of it. Anniversary festivals were celebrated in commemoration of the death and resurrection of Christ, and of the effusion of the Holy Ghost on the apostles. Concerning the days on which these festivals were to be kept, there arose violent contests. The Asiatic churches in general differed in this point from those of Europe: and towards the conclusion of the second century, Victor, bishop of Rome, took it in his head to force the eastern churches to follow the rules laid down by the western ones. This they absolutely refused to comply with: upon which Victor cut them off from communion with the church of Rome; though, by means of the intercession of some prudent people, the difference was made up for a time.

During most of the *third century*, the Christians were allowed to enjoy their religion, such as it was, without molestation. The emperors Maximinus and Decius, indeed, made them feel all the rigours of a severe persecution; but their reigns were short, and from the death of Decius to the time of Dioclesian the church enjoyed tranquillity. Thus vast multitudes were converted: but at the same time the doctrine grew daily more corrupt, and the lives of professed Christians more wicked and scandalous. New ceremonies were invented in great numbers, and an unaccountable passion now prevailed for the oriental superstitions concerning demons; whence proceeded the whole train of exorcisms, spells, and fears for the apparition of evil spirits, which to this day are nowhere eradicated. Hence also the custom of avoiding all connections with those who were not baptised, or who lay under the penalty of excommunication, as persons supposed to be under the dominion of some evil spirit. And hence the rigour and severity of that discipline and penance imposed upon those who had incurred, by their immoralities, the censures of the church. Several alterations were now made in the manner of celebrating the Lord's supper. The prayers used on this occasion were lengthened, and the solemnity and pomp with which it was attended were considerably increased. Gold and silver vessels were used in the celebration; it was thought essential to salvation, and for that reason administered even to infants.—Baptism was celebrated twice a year to such as, after a long course of trial and preparation, offered themselves candidates. The remission of sins was thought to be its immediate consequence; while the bishop, by prayer and imposition of hands, was supposed to confer those sanctifying gifts of the Holy Ghost that are necessary to a life of righteousness and virtue. An evil demon was supposed naturally to reside in every person, who was the author and source of all the corrupt dispositions and unrighteous actions of that person. The driving out of this demon was therefore an essential property of baptism; and, in consequence

of this opinion, the baptized persons returned home clothed in white garments, and adorned with crowns, as sacred emblems, the former of their inward purity and innocence, and the latter of their victory over sin and the world.—Fasting began now to be held in more esteem than formerly. A high degree of sanctity was attributed to this practice; it was even looked upon as indispensably necessary, from a notion that the demons directed their force chiefly against those who pampered themselves with delicious fare, and were less troublesome to the lean and hungry who lived under the severities of a rigorous abstinence.—The sign of the cross also was supposed to administer a victorious power over all sorts of trials and calamities; and was more especially considered as the surest defence against the snares and stratagems of malignant spirits: for which reason, no Christian undertook any thing of moment, without arming himself, as he imagined, with the power of this triumphant sign. The heresies which troubled the church during this century, were the Gnostics, (whose doctrines were new-modelled and improved by Manes, from whom they were afterwards chiefly called *Manicheans*), the Hieracites, Noetians, Sabellians, and Novatians; for an account of which, see those articles.

The *fourth century* is remarkable for the establishment of Christianity by law in the Roman empire; which, however, did not take place till the year 324. In the beginning of the century, the empire was governed by four chiefs, viz. Dioclesian, Maximian, Constantius Chlorus, and Galerius, under whom the church enjoyed a perfect toleration. Dioclesian, though much addicted to superstition, had no ill-will against the Christians; and Constantius Chlorus, having abandoned polytheism, treated them with condescension and benevolence. This alarmed the Pagan priests, whose interests were so closely connected with the continuance of the ancient superstitions; and who apprehended, not without reason, that the Christian religion would at length prevail throughout the empire. To prevent the downfall of the Pagan superstition, therefore, they applied to Dioclesian and Galerius Cæsar; by whom a most bloody persecution was commenced in the year 303, and continued till 311. An asylum, however, was opened for the Christians in the year 304. Galerius having dethroned Dioclesian and Maximian, declared himself emperor in the east; leaving all the western provinces, to which great numbers of Christians resorted to avoid the cruelty of the former, to Constantius Chlorus. At length Galerius, being afflicted with an incurable and dreadful disease, published an edict ordering the persecution to cease, and restoring freedom to the Christians, whom he had most inhumanly oppressed for eight years. Galerius died the same year; and in a short time after, when Constantine the Great ascended the throne, the Christians were freed from any farther uneasiness, by his abrogating all the penal laws against them; and afterwards issuing edicts, by which no other religion than the Christian was tolerated throughout the empire.

This event, however, so favourable to the outward peace of the church, was far from promoting its internal harmony, or the reformation of its leaders. The clergy, who had all this time been augmenting their power at the expence of the liberty of the people, now set no bounds to their ambition. The bishop of Rome was the first in rank, and distinguished by a sort of pre-eminence above the rest of the prelates. He surpassed all his brethren in the magnificence and splendor of the church over which he presided, in the riches of his revenues and possessions, in the number and variety of his ministers, in his credit with the people, and in his sumptuous and splendid manner of living. Hence it happened, that when a new pontiff was to be chosen by the presbyters and people, the city of Rome was generally agitated with dissensions, tumults, and cabals, which

often produced fatal consequences. The intrigues and disturbances which prevailed in that city in the year 366, when, upon the death of Liberius, another pontiff was to be chosen in his place, are a sufficient proof of what we have advanced. Upon this occasion, one faction elected Damasus to that high dignity; while the opposite party chose Ursicinus, a deacon of the vacant church, to succeed Liberius. This double election gave rise to a dangerous schism, and to a sort of civil war within the city of Rome; which was carried on with the utmost barbarity and fury, and produced the most cruel massacres and desolations. The inhuman contest ended in the victory of Damasus; but whether his cause was more just than that of Ursicinus, is not easily to be determined.

Notwithstanding the pomp and splendor which surrounded the Roman see, it is certain that the bishops of Rome had not yet acquired that pre-eminence of power and jurisdiction which they afterwards enjoyed. In the ecclesiastical commonwealth, indeed, they were the most eminent order of citizens; but still they were citizens as well as their brethren, and subject, like them, to the laws and edicts of the emperors. All religious causes of extraordinary importance were examined and determined, either by judges appointed by the emperors, or in councils assembled for that purpose; while those of inferior moment were decided in each district by its respective bishop. The ecclesiastical laws were enacted either by the emperor or councils. None of the bishops acknowledged that they derived their authority from the permission and appointment of the bishop of Rome, or that they were created bishops by the favour of the *apostolic see*. On the contrary, they all maintained that they were the ambassadors and ministers of Jesus Christ, and that their authority was derived from above. It must, however, be observed, that even in this century several of those steps were laid by which the bishops of Rome mounted afterwards to the summit of ecclesiastical power and despotism. This happened partly by the imprudence of the emperors, partly by the dexterity of the Roman prelates themselves, and partly by the inconsiderate zeal and precipitate judgment of certain bishops. The imprudence of the emperor, and precipitancy of the bishops, were remarkably obvious in the following event, which favoured extremely the ambition of the Roman pontiff. About the year 372, Valentinian enacted a law, empowering the bishop of Rome to examine and judge other bishops, that religious disputes might not be decided by any profane or secular judges. The bishops assembled in council at Rome in 378, not considering the fatal consequences that must arise from this imprudent law both to themselves and to the church, declared their approbation in the strongest terms, and recommended the execution of it in their address to the emperor Gratian. Some think, indeed, that this law empowered the Roman bishop to judge only the bishops within the limits of his jurisdiction; others, that his power was given only for a certain time, and for a particular purpose. This last notion seems the most probable: but still this privilege must have been an excellent instrument in the hands of sacerdotal ambition.

By the removal of the seat of empire to Constantinople, the emperor raised up, in the bishop of this new metropolis, a formidable opponent to the bishop of Rome, and a bulwark which threatened a vigorous opposition to his growing authority. For as the emperor, in order to render Constantinople a second Rome, enriched it with all the rights and privileges, honours and ornaments, of the ancient capital of the world; so its bishop, measuring his own dignity and rank by the magnificence of the new city, and its eminence as the residence of the emperor, assumed an equal degree of dignity with the bishop of Rome, and claimed a superiority over the rest of the episcopal order. Nor did the emperors disapprove of these high pretensions, since they considered their own dignity as con-

nected in a certain measure with that of the bishop of their imperial city. Accordingly, in a council held at Constantinople in the year 381, by the authority of Theodosius the Great, the bishop of that city was, during the absence of the bishop of Alexandria, and against the consent of the Roman prelate, placed by the third canon of that council in the first rank after the bishop of Rome, and consequently above those of Alexandria and Antioch. Nestorius was the first bishop who enjoyed these new honours accumulated upon the see of Constantinople. His successor, the celebrated John Chrysostom, extended still farther the privileges of that see, and submitted to its jurisdiction all Thrace, Asia, and Pontus; nor were the succeeding bishops of that imperial city destitute of a fervent zeal to augment their privileges and extend their dominion. By this unexpected promotion, the most disagreeable effects were produced. The bishops of Alexandria were not only filled with the most inveterate hatred against those of Constantinople, but a contention was excited between the bishops of Rome and Constantinople; which, after being carried on for many ages, concluded at last in the separation of the Greek and Latin churches.

Constantine the Great, in order to prevent civil commotions, and to fix his authority on a stable and solid foundation, made several changes not only in the laws of the empire, but also in the form of the Roman government. And as there were many important reasons which induced him to suit the administration of the church to these changes in the civil constitution, this necessarily introduced among the bishops new degrees of eminence and rank. The four bishops, of Rome, Constantinople, Antioch, and Alexandria, were distinguished by a certain degree of pre-eminence over the rest. These four prelates answered to the four prætorian prefects created by Constantine; and it is possible, that even in this century they were distinguished by the Jewish title of *patriarchs*. After these followed the *exarchs*, who had the inspection of several provinces, and answered to the appointment of certain civil officers who bore the same title. In a lower class were the *metropolitans*, who had only the government of one province; under whom were the *archbishops*, whose inspection was confined to certain districts. In this gradation the *bishops* brought up the rear; but the sphere of their authority was not in all places equally extensive; being in some considerably ample, and in others confined within narrow limits. To these various ecclesiastical orders we might add that of the *chorépiscopi*, or superintendants of the country churches; but this last order was in most places suppressed by the bishops, with a design to extend their own authority, and enlarge the sphere of their power and jurisdiction. The administration of the church itself was divided by Constantine into an *external* and *internal* inspection. The latter, which was committed to bishops and councils, related to religious controversies, the forms of divine worship, the offices of priests, the vices of the ecclesiastical orders, &c. The external administration of the church the emperor assumed to himself. This comprehended all those things which related to the outward state and discipline of the church; it likewise extended to all contests that should arise between the ministers of the church, superior as well as inferior, concerning their possessions, their reputation, their rights and privileges, their offences against the laws, &c. but no controversies that related to matters purely spiritual were cognizable by this external inspection. In consequence of this artful division of the ecclesiastical government, Constantine and his successors called councils, presided in them, appointed the judges of religious controversies, terminated the differences which arose between the bishops and the people, fixed the limits of the ecclesiastical provinces, took cognizance of the civil causes that subsisted between the ministers of the church, and punished the crimes committed against the laws by the ordinary judges appointed for that purpose; giving over

all causes purely ecclesiastical to the bishops and councils. But this famous division of the administration of the church was never explained with sufficient accuracy; so that both in the fourth and fifth centuries, there are frequent instances of the emperors determining matters purely ecclesiastical, and likewise of bishops and councils determining matters which related merely to the external form and government of the church.

After the time of Constantine many additions were made by the emperors and others to the wealth and honours of the clergy; and these additions were followed by a proportionable increase of their vices and luxury, particularly among those who lived in great and opulent cities. The bishops, on the one hand, contended with each other in the most scandalous manner concerning the extent of their respective jurisdictions: while, on the other, they trampled on the rights of the people, violated the privileges of the inferior ministers, and imitated in their conduct and in their manner of living the arrogance, voluptuousness, and luxury of magistrates and princes. This pernicious example was soon followed by the several ecclesiastical orders. The presbyters, in many places, assumed an equality with the bishops in point of rank and authority. Many complaints are also made by the authors of this century about the vanity and effeminacy of the deacons. Those more particularly of the presbyters and deacons who filled the first stations of these orders, carried their pretensions to an extravagant length, and were offended at the notion of being placed on an equality with their colleagues. For this reason they not only assumed the titles of *arch-presbyters* and *arch-deacons*, but also claimed a degree of authority and power much superior to that which was vested in the other members of their respective orders.

In the *fifth century*, the bishops of Constantinople having already reduced under their jurisdiction all the Asiatic provinces, began to grasp at still further accessions of power. By the 28th canon of the council held at Chalcedon in 451, it was resolved, that the same rights and honours which had been conferred on the bishop of Rome were due to the bishop of Constantinople, on account of the equal dignity and lustre of the two cities in which these prelates exercised their authority. The same council confirmed also, by a solemn act, the bishop of Constantinople in the spiritual government of those provinces over which he had usurped the jurisdiction. Leo the Great, bishop of Rome, opposed with vehemence the passing of these laws; and his opposition was seconded by that of several other prelates. But their efforts were vain, as the emperors threw their weight into the balance, and thus supported the decisions of the Grecian bishops. In consequence, then, of the decisions of this famous council, the bishop of Constantinople began to contend obstinately for the supremacy with the Roman pontiff, and to crush the bishops of Antioch and Alexandria. About the same time, Juvenal, bishop of Jerusalem, attempted to withdraw himself and his church from the jurisdiction of the bishop of Caesarea, and aspired after a place among the first prelates of the Christian world. The high degree of veneration and esteem in which the church of Jerusalem was held among all other Christian societies (on account of its rank among the apostolical churches, and its title to the appellation of *mother-church*, as having succeeded the first Christian assembly formed by the Apostles), was extremely favourable to the ambition of Juvenal, and rendered his project much more practicable than it would otherwise have been. Encouraged by this, and likewise by the protection of Theodosius the younger, this aspiring prelate not only assumed the dignity of patriarch of all Palestine, a rank which rendered him independent of all spiritual authority; but also invaded the rights of the bishop of Antioch, and usurped his jurisdiction over the provinces of Phœnicia and Arabia. Hence arose a warm contest between Juvenal and Maximus bishop of Antioch; which the council of Chalcedon

decided, by restoring to the latter the provinces of Phœnicia and Arabia, and confirming the former in the spiritual possession of all Palestine, and in the high rank which he had assumed in the church.

In 588, John bishop of Constantinople, surnamed the *Faster*, either by his own authority or that of the emperor Mauritius, summoned a council at Constantinople to inquire into an accusation brought against Gregory bishop of Antioch; and upon this occasion assumed the title of *œcumenical* or *universal bishop*. This title had been formerly enjoyed by the bishops of Constantinople without any offence; but now, Gregory the Great, at that time bishop of Rome, suspecting that John was aiming at the supremacy over all the churches, opposed his claim with the greatest vigour. For this purpose he applied by letters to the emperor, and others whom he thought capable of assisting him in his opposition: but all his efforts were without effect; and the bishops of Constantinople were allowed to enjoy the disputed title, though not in the sense which had alarmed the Roman pontiff.

Gregory, however, adhered tenaciously to his purpose, raised new tumults and dissensions among the clergy, and aimed at nothing less than an unlimited supremacy over the Christian church. This ambitious design succeeded in the west; while, in the eastern provinces, his arrogant pretensions were scarcely respected by any but those who were at enmity with the bishop of Constantinople. How much the people were at this time deluded by the Roman pontiffs, appears from the expression of Ennodius, one of the flatterers of Symmachus (who was a prelate of but ambiguous fame), that the Roman pontiff was constituted judge in the place of God, which he filled as the vicergerent of the Most High. On the other hand it is certain, from a variety of the most authentic records, that both the emperors and the nations in general were far from being disposed to bear with patience the yoke of servitude which the see of Rome was arrogantly imposing on the whole church.

In the beginning of the *seventh century*, according to the most learned historians, Boniface III. engaged Phocas, emperor of Constantinople, to take from the bishop of that metropolis the title of *œcumenical* or *universal bishop*, and to confer it upon the Roman pontiff; and thus was first introduced the supremacy of the pope. The Roman pontiffs used all methods to maintain and enlarge this authority and pre-eminence which they had acquired from one of the most odious tyrants that ever disgraced the annals of history.

In the *eighth century*, the power of the bishop of Rome, and of the clergy in general, increased prodigiously. The chief cause of this, besides the superstition of the people, was the method at that time used by the European princes to secure themselves on their thrones. All these princes being then employed either in usurpation or in self-defence, and the whole continent being in the most unsettled and barbarous condition, they endeavoured to attach warmly to their interests those whom they considered as their friends and clients. For this purpose they distributed among them extensive territories, cities, and fortresses, with the various rights and privileges belonging to them; reserving only to themselves the supreme dominion and the military service of these powerful vassals. For this reason it was by the European princes reckoned a high instance of political prudence to distribute among the bishops and other Christian doctors the same sort of donations which had formerly been given to their generals and clients. By means of the clergy, they hoped to check the seditions and turbulent spirits of their vassals; and to maintain them in their obedience by the influence and authority of their bishops, whose commands were highly respected, and whose spiritual thunderbolts, rendered formidable by ignorance, struck terror into the boldest and most resolute hearts.

This prodigious accession to the opulence and authority of the clergy in the west, began at their head, viz. the Roman pontiff; from whence it spread gradually among the inferior sacerdotal orders. The barbarous nations who had received the gospel, looked upon the bishop of Rome as the successor of their chief druid or high priest: and as this tremendous druid had enjoyed, under the darkness of Paganism, a kind of boundless authority; so these barbarous nations thought proper to confer upon the chief bishop the same authority which had belonged to the chief druid. The pope received these august privileges with great pleasure; and lest, upon any change of affairs, attempts should be made to deprive him of them, he strengthened his title to these extraordinary honours by a variety of passages drawn from ancient history, and, what is still more astonishing, by arguments of a religious nature. This swelled the Roman druid to an enormous size; and gave to the see of Rome that high pre-eminence and despotic authority in civil and political matters, that were unknown to former ages. Hence, among other unhappy circumstances, arose that monstrous and pernicious opinion, that such persons as were excluded from the communion of the church by the pontiff himself, or any of the bishops, forfeited thereby, not only their civil rights and advantages as citizens, but even the common claims and privileges of humanity. This horrid opinion, which was a fatal source of wars, massacres, and rebellions, without number, and which contributed more than any thing else to confirm and augment the papal authority, was borrowed by the clergy from the Pagan superstitions.—Though excommunication, from the time of Constantine the Great, was in every part of the Christian world attended with many disagreeable effects; yet its highest terrors were confined to Europe, where its aspect was truly formidable and hideous. It acquired also, in the eighth century, new accessions of terror; so that from that period the excommunication practised in Europe differed entirely from that which was in use in other parts of Christendom. Excommunicated persons were indeed considered in all places as objects of hatred both to God and man: but they were not, on that account, robbed of the privileges of citizens, nor of the rights of humanity; much less were those kings and princes, whom an insolent bishop had thought proper to exclude from the communion of the church, supposed to forfeit on that account their crowns or their territories. But from this century it was quite otherwise in Europe. Excommunication received that infernal power which dissolved all connections; so that those whom the bishops, or their chief, excluded from church communion, were degraded to a level with the beasts. The origin of this unnatural and horrid power was as follows. On the conversion of the barbarous nations to Christianity, these ignorant profelytes confounded the excommunication in use among Christians with that which had been practised in the times of Paganism, and which was attended with all the dreadful effects above mentioned. The Roman pontiffs, on the other hand, were too artful not to encourage this error; and therefore employed all sorts of means to gain credit to an opinion so well calculated to gratify their ambition, and to aggrandize in general the episcopal order.

The annals of the French nation furnish us with the following instance of the enormous power which was at this time vested in the Roman pontiff. Pepin, who was mayor of the palace to Childeric III. king of France, and who in the exercise of that high office was possessed in reality of the royal power and authority, aspired to the titles and honours of majesty also, and formed a scheme of dethroning his sovereign. For this purpose he assembled the states in 751; and though they were devoted to the interests of this ambitious usurper, they gave it as their opinion that the bishop of Rome was previously to be consulted whether the execution of such a scheme was lawful or not. In

consequence of this, ambassadors were sent by Pepin to Zachary, the reigning pontiff, with the following question, "Whether the divine law did not permit a valiant and warlike people to dethrone a pusillanimous and indolent prince who was incapable of discharging any of the functions of royalty; and to substitute in his place one more worthy to rule, and who had already rendered most important services to the state?" The situation of Zachary, who stood much in need of the succours of Pepin against the Greeks and Lombards, rendered his answer such as the usurper desired: and when this favourable decision of the Roman oracle was published in France, the unhappy Childeric was stripped of his royalty without the least opposition; and Pepin, without the smallest resistance, stepped into the throne of his master and his sovereign. This decision was solemnly confirmed by Stephen II. the successor of Zachary; who undertook a journey into France in the year 754, in order to solicit assistance against the Lombards. The pontiff at the same time dissolved the obligation of the oath of fidelity and allegiance which Pepin had sworn to Childeric, and violated by his usurpation in the year 751; and to render his title to the crown as sacred as possible, Stephen anointed and crowned him, with his wife and two sons, for the second time. This complaisance of the pope was rewarded with the exarchate of Ravenna and all its dependencies, as has been already related.

In the succeeding centuries, the Roman pontiffs continued to increase their power by every kind of artifice and fraud; and, by continually taking advantage of the civil dissensions which prevailed throughout Italy, France, and Germany, their influence in civil affairs arose to an enormous height. The increase of their authority in religious matters was not less rapid. The wisest and most impartial among the Roman Catholic writers acknowledge, that from the time of Louis the Meek the ancient rules of ecclesiastical government were gradually changed in Europe by the counsels and instigation of the church of Rome, and new laws substituted in their place. The European princes suffered themselves to be divested of the supreme authority in religious matters, which they had derived from Charlemagne; the power of the bishops was greatly diminished, and even the authority of both provincial and general councils began to decline. The popes, elated with their overgrown prosperity, and become arrogant beyond measure by the daily accessions that were made to their authority, were eagerly bent upon establishing the maxim, That the bishop of Rome was constituted and appointed by Jesus Christ supreme legislator and judge of the church universal; and that therefore the bishops derived all their authority from him. This opinion, which they inculcated with the utmost zeal and ardour, was opposed in vain by such as were acquainted with the ancient ecclesiastical constitutions, and the government of the church in the earlier ages. In order to gain credit to this new ecclesiastical code, and to support the pretensions of the popes to supremacy, it was necessary to produce the authority of ancient deeds, in order to stop the mouths of such as were disposed to set bounds to their usurpations. The bishops of Rome were aware of this; and as those means were looked upon as the most lawful that tended best to the accomplishment of their purposes, they employed some of their most ingenious and zealous partisans in forging conventions, acts of councils, epistles, and such-like records, by which it might appear, that in the first ages of the church the Roman pontiffs were clothed with the same spiritual majesty and supreme authority which they now assumed. There were not, however, wanting among the bishops some men of prudence and sagacity, who saw through these impious frauds, and perceived the chains that were forging both for them and the church. The French bishops distinguished themselves eminently in this respect: but their opposition was soon quashed; and as all Europe was sunk in the grossest ignorance and darkness, none re-

maintained who were capable of detecting these odious impostures, or disposed to support the expiring liberty of the church.

This may serve as a general specimen of the character and behaviour of the pretended vicegerents of Jesus Christ to the 16th century. In the 11th century, indeed, their power seems to have risen to its utmost height. They now received the pompous titles of *Masters of the World*, and *Popes*, i. e. *universal fathers*. They presided every where in the councils by their legates, assumed the authority of supreme arbiters in all controversies that arose concerning religion or church discipline, and maintained the pretended rights of the church against the encroachments and usurpations of kings and princes. Their authority, however, was confined within certain limits: for, on the one hand, it was restrained by sovereign princes, that it might not arrogantly aim at civil dominion; and, on the other, it was opposed by the bishops themselves, that it might not arise to a spiritual despotism, and utterly destroy the privileges and liberty of synods and councils. From the time of Leo IX. the popes employed every method which the most artful ambition could suggest to remove those limits, and to render their dominion both despotic and universal. They not only aspired to the character of supreme legislators in the church, to an unlimited jurisdiction over all synods and councils whether general or provincial, to the sole distribution of all ecclesiastical honours and benefices, as divinely authorised and appointed for that purpose; but they carried their insolent pretensions so far as to give themselves out for lords of the universe, arbiters of the fate of kingdoms and empires, and supreme rulers over the kings and princes of the earth. Hence we find instances of their giving away kingdoms, and loosing subjects from their allegiance to their sovereigns; among which the history of John king of England is very remarkable. At last they plainly assumed the whole earth as their property, as well where Christianity was preached as where it was not; and therefore, on the discovery of America and the East Indies, the pope, by virtue of this spiritual property, granted to the Portuguese a right to all the countries lying eastward, and to the Spaniards all those lying to the westward, of Cape Non in Africa, which they were able to conquer by force of arms; and that nothing might be wanting to complete their character, they pretended to be lords of the future world also, and to have a power of restraining even the divine justice itself, and remitting that punishment which the Deity hath denounced against the workers of iniquity.

All this time the powers of superstition reigned triumphant over those remains of Christianity which had escaped the corruptions of the first four centuries. In the fifth century began the invocation of the happy souls of departed saints. Their assistance was entreated by many fervent prayers, while none stood up to oppose this preposterous kind of worship. The images of those who during their lives had acquired the reputation of uncommon sanctity, were now honoured with a particular worship in several places; and many imagined that this drew into the images the propitious presence of the saints or celestial beings which they were supposed to represent. A singular and irresistible efficacy was attributed to the bones of martyrs, and to the figure of the cross, in defeating all the attempts of Satan, removing all sorts of calamities, and in healing not only the diseases of the body, but also those of the mind. The famous Pagan doctrine concerning the *purification of departed souls* by means of a certain kind of fire, i. e. purgatory, was also confirmed and explained more fully than it had formerly been; and every one knows of how much consequence this absurd doctrine once was to the wealth and power of the Romish clergy.

In the *sixth century*, Gregory the Great advanced an opinion, That all the *words* of the sacred writings were *images* of invisible and spiritual things; for which reason he loaded the churches with a multitude of ceremonies the most insignificant and futile

that can be imagined; and hence arose a new and most difficult science, namely, the explication of these ceremonies, and the investigation of the causes and circumstances whence they derived their origin. A new method was contrived of administering the Lord's supper, with a magnificent assemblage of pompous ceremonies. This was called the *canon of the mass*. Baptism, except in cases of necessity, was administered only on the great festivals. An incredible number of temples were erected in honour of the saints. The places set apart for public worship were also very numerous: but now they were considered as the means of purchasing the protection and favour of the saints; and the ignorant and barbarous multitude were persuaded, that these departed spirits defended and guarded against evils and calamities of every kind, the provinces, lands, cities, and villages in which they were honoured with temples. The number of these temples was almost equalled by that of the festivals, which seem to have been invented in order to bring the Christian religion as near the model of Paganism as possible.

In the *seventh century*, religion seemed to be altogether buried under a heap of superstitious ceremonies; the worship of the true God and Saviour of the world was exchanged for the worship of bones, bits of wood (said to be of the cross), and the images of saints. The eternal state of misery threatened in Scripture to the wicked was exchanged for the temporary punishment of purgatory; and the expressions of faith in Christ by an upright and virtuous conduct, for the augmentation of the riches of the clergy by donations to the church, and the observance of a heap of idle ceremonies. New festivals were still added; one in particular was instituted in honour of the *true cross* on which our Saviour suffered: and churches were declared to be sanctuaries to all such as fled to them, whatever their crimes might have been.

Superstition, it would seem, had now attained its highest pitch; nor is it easy to conceive a degree of ignorance and degeneracy beyond what we have already mentioned. If any thing can possibly be imagined more contrary to true religion, it is an opinion which prevailed in the eighth century, namely, That Christians might appease an offended Deity by voluntary acts of mortification, or by gifts and oblations lavished on the church; and that people ought to place their confidence in the works and merits of the saints. The piety in this and some succeeding ages consisted in building and embellishing churches and chapels; in endowing monasteries and basilics; hunting after the relics of saints and martyrs, and treating them with an absurd and excessive veneration; in procuring the intercession of the saints by rich oblations, or superstitious rites; in worshipping images; in pilgrimages to those places which were esteemed holy, particularly to Palestine, &c. The genuine religion of Jesus was now utterly unknown both to clergy and people, if we except a few of its general doctrines contained in the creed. In this century also, the superstitious custom of *solitary masses* had its origin. These were celebrated by the priest alone in behalf of souls detained in purgatory, as well as upon some other occasions. They were prohibited by the laws of the church, but proved a source of immense wealth to the clergy. Under Charlemagne they were condemned by a synod assembled at Mentz, as criminal effects of avarice and sloth. A new superstition, however, still sprung up in the tenth century. It was imagined, from Rev. xx. 1. that Antichrist was to make his appearance on the earth, and that soon after the world itself would be destroyed. An universal panic ensued; vast numbers of people, abandoning all their connections in society, and giving over to the churches and monasteries all their worldly effects, repaired to Palestine, where they imagined that Christ would descend from heaven to judge the world. Others devoted themselves by a solemn and voluntary oath to the service of the churches, convents, and priesthood, whose slaves they became,

in the most rigorous sense of that word, performing daily their heavy tasks; and all this from a notion that the supreme judge would diminish the severity of their sentence, and look upon them with a more favourable and propitious eye, on account of their having made themselves the slaves of his ministers. When an eclipse of the sun or moon happened to be visible, the cities were deserted, and their miserable inhabitants fled for refuge to hollow caverns, and hid themselves among the craggy rocks, and under the bending summits of steep mountains. The opulent attempted to bribe the Saints and the Deity himself by rich donations conferred upon the sacerdotal tribe, who were looked upon as the immediate vicegerents of heaven. In many places, temples, palaces, and noble edifices both public and private, were suffered to decay, nay, were deliberately pulled down, from a notion that they were no longer of any use, as the final dissolution of all things was at hand. In a word, no language is sufficient to express the confusion and despair that tormented the minds of miserable mortals upon this occasion. The general delusion was indeed opposed and combated by the discerning few, who endeavoured to dispel these terrors, and to efface the notion from which they arose in the minds of the people. But their attempts were ineffectual; nor could the dreadful apprehensions of the superstitious multitude be removed before the end of the century, and this terror became one of the accidental causes of the *CRUSADES*.

That nothing might now be wanting to complete that anti-christian system of religion which had overspread all Europe, it was in the 11th century determined that divine worship should be celebrated in the Latin tongue, though now unknown throughout the continent. During the whole of this century, also, Christians were employed in the rebuilding and ornamenting their churches, which they had destroyed through the superstitious fear already taken notice of.

In much the same way with what is above related, or worse if possible, matters went on till the time of the reformation. The clergy were immersed in crimes of the deepest dye; and the laity, imagining themselves able to purchase pardon of their sins for money, followed the example of their pastors without remorse. The absurd principle formerly mentioned, namely, that religion consists in acts of austerity, and an unknown mental correspondence with God, produced the most extravagant and ridiculous behaviour in the devotees and reputed saints. They not only lived among the wild beasts, but also after the manner of those savage animals: they ran naked through the lonely deserts with a furious aspect, and all the agitations of madness and phrensy; they prolonged a wretched life by grass and wild herbs, avoided the sight and conversation of men, remained almost motionless in certain places for several years exposed to the rigour and inclemency of the seasons, and towards the conclusion of their lives shut themselves up in narrow and miserable huts; and all this was considered as true piety, the only acceptable method of worshipping the Deity and attaining a share in his favour.—But of all the instances of superstitious phrensy which disgraced the times we now speak of, none was held in higher veneration, or excited more the wonder of the multitude, than that of a certain order of men who were called *Stilitæ* by the Greeks, and *Sancti Columnares*, or Pillar Saints, by the Latins. These were persons of a most singular and extravagant turn of mind, who stood motionless on the tops of pillars expressly raised for this exercise of their patience, and remained there for several years amidst the admiration and applause of the stupid populace. The inventor of this strange discipline was one *Simon* a Syrian, who began his follies by changing the agreeable employment of a shepherd for the austerities of a monkish life. He began his devotion on the top of a pillar six cubits high; but as he increased in sanctity, he also increased the height of his pillar,

till, towards the conclusion of his life, he had got up on the top of a pillar 40 cubits in height. Many of the inhabitants of Syria and Palestine, seduced by a false ambition and an utter ignorance of true religion, followed the example of this fanatic, though not with the same degree of austerity. This superstitious practice began in the fifth century, and continued in the east for 600 years. The Latins, however, had too much wisdom and prudence to imitate the Syrians and Orientals in this whimsical superstition: and when a certain fanatic, or impostor, named *Wulfilaicus*, erected one of these pillars in the country of Treves, and proposed to live on it after the manner of *Simon*, the neighbouring bishops ordered it to be pulled down.

The practices of austere worship and discipline in other respects, however, gained ground throughout all parts of Christendom. Monks of various kinds were to be found in every country in prodigious numbers. But though their discipline was at first exceedingly severe, it became gradually relaxed, and the monks gave into all the prevailing vices of the times. Other orders succeeded, who pretended to still greater degrees of sanctity, and to reform the abuses of the preceding ones; but these in their turn became corrupted, and fell into the same vices they had blamed in others. The most violent animosities, disputes, and hatred, also reigned among the different orders of monks; and, indeed, between the clergy of all ranks and degrees, whether we consider them as classed in different bodies, or as individuals of the same body. To enter into a detail of their wranglings and disputes, the methods which each of them took to aggrandise themselves at the expence of their neighbours, and to keep the rest of mankind in subjection, would require many volumes. We shall only observe, therefore, that even the external profession of the austere and absurd piety which took place in the fourth and fifth centuries, continued gradually to decline. Some there were, indeed, who boldly opposed the torrent of superstition and wickedness which threatened to overflow the whole world: but their opposition proved fruitless, and all of these towards the era of the reformation had been either silenced or destroyed: so that, at that time, the pope and clergy reigned over mankind without controul, had made themselves masters of almost all the wealth in every country of Europe, and may truly be said to have been the only *sovereigns*; the rest of the human race, even kings and princes, being only their vassals and slaves.

While the Popish superstition reigned thus violently in the west, the absurd doctrines of Mahomet overspread all the east. The rise of this impostor is well known. His successors conquered in order to establish the religion of their apostle; and thus the very name of Christianity was extinguished in many places where it had formerly flourished. The conquests of the Tartars having intermingled them with the Mahometans, they greedily embraced the superstitions of that religion, which thus almost entirely overspread the whole continents of Asia and Africa; and, by the conquest of Constantinople by the Turks in 1453, was likewise established throughout a considerable part of Europe.

About the beginning of the 16th century, the Roman pontiffs lived in the utmost tranquillity; nor had they, according to the appearance of things at that time, any reason to fear an opposition to their authority in any respect, since the commotions which had been raised by the Waldenses, Albigenses, &c. were now entirely suppressed. We must not however conclude, from this apparent tranquillity and security of the pontiffs and their adherents, that their measures were universally applauded. Not only private persons, but also the most powerful princes and sovereign states, exclaimed loudly against the tyranny of the popes, and the unbridled licentiousness of the clergy of all denominations. They demanded, therefore, a reformation of the church in its head and members, and a general council to accomplish that

necessary purpose. But these complaints and demands were not carried to such a length as to produce any good effect; since they came from persons who never entertained the least doubt about the supreme authority of the pope in religious matters, and who of consequence, instead of attempting themselves to bring about that reformation which was so ardently desired, remained entirely inactive, or looked for redress to the court of Rome, or to a general council. But while the so much desired reformation seemed to be at such a great distance, it suddenly arose from a quarter whence it was not at all expected. A single person, Martin Luther, a monk of the order of St. Augustine, ventured to oppose himself to the whole torrent of papal power and despotism. This bold attempt was first made public on the 30th of September 1517; and, notwithstanding all the efforts of the pope and his adherents, the doctrines of Luther continued daily to gain ground. Others, encouraged by his success, lent their assistance in the work of reformation; which at last produced new churches, founded upon principles quite different from that of Rome, and which still continue. But for some account of the transactions of the first reformers, see the articles LUTHER and REFORMATION.

The state of religion in other parts of the world seems as yet to be but little altered. Asia and Africa are sunk in the grossest superstitions either of the Mahometan or Pagan kinds. The southern continent of America, belonging to the Spaniards, continues immersed in the most absurd superstitions of Popery. The northern continent, being mostly peopled with colonies from Great Britain, professes the reformed religion. At the same time it must be owned, that some kind of reformation hath taken place even in Popery and Mahometanism themselves. The popes have no longer that authority over states and princes, even those most bigoted to Popery, which they formerly had. Neither are the lives either of the clergy or laity so corrupt as they were before. The increase of learning in all parts of the world has contributed to make men open their eyes to the light of reason, and this hath been attended with a proportional decrease of superstition. Even in Mahometan countries, that furious enthusiasm which formerly emboldened the inhabitants to face the greatest dangers, hath now almost vanished; so that the credit of Mahomet himself seems to have sunk much in the estimation of his followers. This is to be understood even of the most ignorant and bigoted multitude; and the sensible part of the Turks are said to incline much towards Deism. With regard to those nations which still profess Paganism, the intercourse of Europeans with them is so small, that it is impossible to say any thing concerning them. As none of them are in a state of civilization, however, it may be conjectured that their religion is of the same unpolished cast with their manners; and that it consists of a heap of barbarous superstitions which have been handed down among them from time immemorial, and which they continue to observe merely on that account.

C H A P. III.

Of the COMPOSITION of HISTORY.

CICERO has given us the whole art of composing history, in a very short and comprehensive manner. We shall first quote what he says, and then consider the several parts of it in their proper order. "No one is ignorant (says he), that the first law in writing history is, Not to dare to say any thing that is false; and the next, Not to be afraid to speak the truth: that on the one hand there be no suspicion of affection, nor of prejudice on the other. These foundations are what all are acquainted with. But the superstructure consists partly in things, and partly in the style or language. The

former require an order of times, and descriptions of places. And because in great and memorable events we are desirous to know first their causes, then the actions themselves, and lastly their consequences; the historian should take notice of the springs or motives that occasioned them; and, in mentioning the facts themselves, should not only relate what was done or said, but likewise in what manner; and, in treating upon their consequences, shew if they were the effects of chance, wisdom, or imprudence. Nor should he only recite the actions of great and eminent persons, but likewise describe their characters. The style ought to be silent, smooth, and even, free from that harshness and poignancy which is usual at the bar." Thus far Cicero. An history written in this manner, and furnished with all these properties, must needs be very entertaining, as well as instructive. And perhaps few have come nearer this plan than Tacitus; though his subject is attended with this unhappy circumstance, or at least unpleasant one, that it affords us examples rather of what we ought to avoid than what to imitate. But it is the business of the historian, as well as of the philosopher, to represent both virtues and vices in their proper colours; the latter doing it by precepts, and the former by examples. Their manner is different; but the end and design of both is, or should be, the same: and therefore history has not improperly been said by some to be moral philosophy exemplified in the lives and actions of mankind.

We shall reduce these several things mentioned by Cicero under three heads, Matter, Order, and Style; and treat upon each of them separately. But as Truth is the basis and foundation of all history, it will be necessary to consider that in the first place.

SECT. I. *Of Historical Truth.*

TRUTH is, as it were, the very life and soul of history, by which it is distinguished from fable or romance. An historian therefore ought not only to be a man of probity, but void of all passion or bias. He must have the steadiness of a philosopher, joined with the vivacity of a poet or orator. Without the former, he will be insensibly swayed by some passion to give a false colouring to the actions or characters he describes, as favour or dislike to parties or persons affects his mind. Whereas he ought to be of no party, nor to have either friend or foe while writing; but to preserve himself in a state of the greatest indifference to all, that he may judge of things as they really are in their own nature, and not as connected with this or that person or party. And with this firm and sedate temper, a lively imagination is requisite; without which his descriptions will be flat and cold, nor will he be able to convey to his readers a just and adequate idea of great and generous actions. Nor is the assistance of a good judgment less necessary than any of the former qualities, to direct him what is proper to be said and what to be omitted, and to treat every thing in a manner suitable to its importance. And since these are the qualifications necessary for an historian, it may perhaps seem the less strange that we have so few good histories extant.

But historical truth consists of two parts; one is, Not to say any thing we know to be false. Though it is not sufficient to excuse an historian in relating a falsehood that he did not know it was so when he wrote it, unless he first used all the means in his power to inform himself of the truth; for then, undoubtedly, an invincible error is as unpardonable in history as in morality. But the generality of writers of this kind content themselves with taking their accounts from hearsay, or transcribing them from others; without duly weighing the evidence on which they are founded, or giving themselves the trouble of a strict inquiry. Few will use the diligence necessary to inform themselves of the certainty of what they undertake

to relate. And as the want of this greatly abates the pleasure of reading such writers, while persons read with diffidence; so nothing more recommends an historian than such industry. Thus we are informed of Thucydides, that when he wrote his history of the Peloponnesian war, he did not satisfy himself with the best accounts he could get from his countrymen the Athenians, fearing they might be partial in their own cause; but spared no expence to inform himself how the same facts were related by their enemies the Lacedemonians; that, by comparing the relations of both parties, he might better judge of the truth. And Polybius took greater pains than he, in order to write his history of the Roman affairs; for he travelled into Africa, Spain, Gaul, and other parts of the world, that, by viewing the several scenes of action, and informing himself from the inhabitants, he might come at a greater certainty of the facts, and represent them in a juster light. But as a historian ought not to assert what he knows to be false; so he should likewise be cautious in relating things which are doubtful, and acquaint his readers with the evidence he goes upon in such facts, from whence they may be able to judge how far it is proper to credit them. So Herodotus tells us what things he saw himself in his travels, and what he heard from the information of the Egyptian priests and others with whom he conversed. And Curtius, in the Life of Alexander, speaking of the affairs of India, ingenuously confesses, that he wrote more than he fully believed. "For (says he) I neither dare to affirm positively what I doubt of, nor can I think it proper to omit what I have been told." By such a conduct the author secures his credit, whether the things prove really true or false; and gives room for further enquiry, without imposing on his readers.

The other branch of historical truth is, Not to omit any thing that is true, and necessary to set the matter treated of in a clear and full light. In the actions of past ages or distant countries, wherein the writer has no personal concern, he can have no great inducement to break in upon this rule. But where interest or party is engaged, it requires no small candour, as well as firmness of mind, constantly to adhere to it. Affection to some, aversion to others, fear of disoblighing friends or those in power, will often interpose and try his integrity. Besides, an omission is less obnoxious to censure, than a false assertion: for the one may be easily ascribed to ignorance or forgetfulness; whereas the other will, if discovered, be commonly looked upon as design. He therefore, who in such circumstances, from a generous love to truth, is superior to all motives to betray or stifle it, justly deserves the character of a firm as well as honest man. What Polybius says upon this head is very well worth remarking: "A good man ought to love his friends and his country, and to have a like disposition with them, both towards their friends and enemies. But when he takes upon him the character of an historian, they must all be forgot. He must often speak well of his enemies, and commend them when their actions deserve it; and sometimes blame, and even upbraid his greatest friends, when their conduct makes it necessary. Nor must he forbear sometimes to reprove, and at other times to commend, the same persons; since all are liable to mistake in their management, and there are scarce any persons who are always in the wrong. Therefore, in history, all personal considerations should be laid aside, and regard had only to their actions."

What a different view of mankind and their actions should we have were these rules observed by all historians? Integrity is undoubtedly the principal qualification of an historian; when we can depend upon this, other imperfections are more easily passed over. Suetonius is said to have written the lives of the first twelve Roman emperors with the same freedom wherewith they themselves lived. What better character can be given of a writer? The same ingenuous temper appears in the two Grecian historians above mentioned, Thucydides and Polybius:

the former of whom, though banished by his countrymen the Athenians, yet expresses no marks of resentment in his history, either against them in general, or even against the chief authors of it, when he has occasion to mention them; and the latter does not forbear censuring what he thought blameable in his nearest relations and friends. But it is often no easy matter to know whether an historian speaks truth or not, and keeps up to the several characters here mentioned; though it seems reasonable, upon the common principles of justice due to all mankind, to credit him where no marks of partiality or prejudice appear in his writings. Sometimes, indeed, a judgment may in a good measure be formed of the veracity of an author, from his manner of expressing himself. A certain candour and frankness, that is always uniform and consistent with itself, runs through their writings who have nothing in view but truth, which may be justly esteemed as a very good evidence of their sincerity. Whereas those who have partial designs to answer are commonly more close and covert; and if at other times they assume an air of openness and freedom, yet this is not constant and even, but soon followed again with the appearance of some bias and reserve: for it is very difficult to act a part long together without lying open to a discovery. And therefore, though craft and design is exceeding various, and, Proteus-like, assumes very different shapes, there are certain characters by which it may often be perceived and detected. Thus, where things are uncertain because of their being reported various ways, it is partiality in an historian to give into the most unfavourable account, where others are as well known and equally credible. Again, it is a proof of the same bad temper, when the facts themselves are certain and evident, but the design and motives of those concerned in them are unknown and obscure, to assign some ill principle, such as avarice, ambition, malice, interest, or any other vicious habit, as the cause of them. This conduct is not only unjust to the persons whose actions they relate; but hurtful to mankind in general, by endeavouring to destroy the principal motive to virtue, which springs from example. Others, who affect to be more covert, content themselves with suspicions and sly insinuations; and then endeavour to come off, by intimating their unwillingness to believe them, though they would have their readers do so. And to mention no more, there are others, who, when they have loaded persons with unjust calumnies and reflections, will allow them some slight commendations, to make what they have said before look more credible, and themselves less partial. But the honest and faithful historian condemns all such low and mean arts; he considers things as they are in themselves, and relates them as he finds them, without prejudice or partiality.

SECT. II. *Of the Subject of History.*

By the *subject* of history we mean facts themselves, together with such things as are either connected with them, or may at least be requisite to set them in a just and proper light. But although the principal design of history be to record facts, yet all facts do not merit the regard of an historian; but such only as may be thought of use in regulating the conduct of human life. Nor is it allowable for him, like the poet, to form the plan and scheme of his work as he pleases. His business is to report things as he finds them, without any colouring or disguise to make them more pleasing and palatable to his reader, which would be to convert his history into a novel. Indeed, some histories afford more pleasure and entertainment than others, from the nature of things of which they consist; and it may be esteemed the happiness of an historian to meet with such a subject, but it is not his fault if it be otherwise. Thus Herodotus begins his history with showing, that the barbarians gave the first occasion to the wars between them and the Greeks, and ends it with an account of the punishment which, after some ages,

they suffered from the Greeks on that account. Such a relation must not only be very agreeable to his countrymen the Grecians, for whose sakes it was written; but likewise very instructive, by informing them of the justice of Providence in punishing public injuries in this world, wherein societies, as such, are only capable of punishment. And therefore those examples might be of use to caution them against the like practices. On the contrary, Thucydides begins his history with the unhappy state of his countrymen the Athenians; and in the course of it plainly intimates, that they were the cause of the calamitous war between them and the Lacedemonians. Whereas, had he been more inclined to please and gratify his countrymen than to write the truth, he might have set things in such a light as to have made their enemies appear the aggressors. But he scorned to court applause at the expence of truth and justice, and has set a noble example of integrity to all future historians. But as all actions do not merit a place in history, it requires no small judgment in an historian to select such only as are proper. Cicero observes very justly, that history "is conversant in great and memorable actions." For this reason, an historian should always keep posterity in view; and relate nothing which may not, upon some account or other, be worth the notice of ages. To descend to trivial and minute matters, such as frequently occur in the common affairs of life, is below the dignity of history. Such writers ought rather to be deemed journalists than historians, who have no view or expectation that their works should survive them. But the skilful historian is fired with a more noble ambition. His design is to acquaint succeeding ages with what remarkable occurrences happened in the world before them; to do justice to the memory of great and virtuous men; and at the same time to perpetuate his own. Pliny the younger has some fine reflections upon this head, in a letter to a friend. "You advise me (says he) to write an history; and not you only, for many others have done the same, and I am myself inclined to it. Not that I believe myself qualified for it, which would be rash to think till I have tried it; but because I esteem it a generous action not to suffer those to be forgotten, whose memory ought to be eternized; and to perpetuate the names of others, together with one's own. For there is nothing I am so desirous or ambitious of, as to be remembered hereafter; which is a thing worthy of a man, especially of one who, conscious of no guilt, has nothing to fear from posterity." This was Pliny's opinion with regard to the use and advantage of history; the subjects of which are generally matters of weight and importance. And therefore, when a prudent historian thinks it convenient to take notice of things in themselves less considerable, he either does it with brevity, or for some apparent reason, or accounts for it by some just apology. So Dion Cassius, when he has mentioned some things of less moment in the life of Commodus (as indeed that emperor's life was chiefly filled up with cruelty and folly), makes this excuse for himself: "I would not have it thought that I descend below the gravity of history in writing these things: for, as they were the actions of an emperor, and I was present and saw them all, and both heard and conversed with him, I did not think it proper to omit them." He seems to think those actions, when performed by an emperor, might be worth recording, which, if done by a person of inferior rank, would scarce have deserved notice. Nor does he appear to have judged amiss, if we consider what an influence the conduct and behaviour of princes, even in the common circumstances of life, have upon all beneath them; which may sometimes render them not unworthy the regard of an historian, as examples either for imitation or abhorrence.

But although facts in general are the proper subject of history, yet they may be differently considered with regard to the extent of them, as they relate either to particular persons or communities of men. And from this consideration history has

been distinguished into three sorts, viz. *biography*, *particular* and *general history*. The lives of single persons is called *biography*. By *particular history* is meant that of particular states, whether for a shorter or longer space of time. And *general history* contains an account of several states existing together in the same period of time.

1. The subjects of *biography* are the lives either of public or private persons; for many observations useful in the conduct of human life may be made from just accounts of those who have been eminent and beneficial to the world in either station. Nay, the lives of vicious persons are not without their use, as warnings to others, by observing the fatal consequences which sooner or later generally follow such practices. But, for those who exposed their lives, or otherwise employed their time and labour, for the service of their fellow-creatures, it seems but a just debt that their memories should be perpetuated after them, and posterity acquainted with their benefactors. The expectation of this was no small incentive to virtue in the Pagan world. And perhaps every one, upon due reflection, will be convinced how natural this passion is to mankind in general. And it was for this reason, probably, that Virgil places not only his heroes, but also the inventors of useful arts and sciences, and other persons of distinguished merit, in the Elysian Fields, where he thus describes them:

Here patriots live, who, for their country's good,
In fighting fields were prodigal of blood:
Priests of unblemish'd lives here make abode,
And poets worthy their inspiring god;
And searching wits of more mechanic parts,
Who grac'd their age with new-invented arts;
Those who to worth their bounty did extend,
And those who knew that bounty to commend:
The heads of these with holy fillets bound,
And all their temples were with garlands crown'd.

ÆNEID, l. vi. v. 66.

In the lives of public persons, their public characters are principally, but not solely, to be regarded. The world is inquisitive to know the conduct of princes and other great men, as well in private as in public; and both, as has been said, may be of service, considering the influence of their examples. But to be over-inquisitive in searching into the weaknesses and infirmities of the greatest or best of men, is, to say no more of it, but a needless curiosity. Among writers of this kind, Plutarch is justly allowed to excel.

But it has been a matter of dispute among the learned, whether any one ought to write his own history. It may be pleaded in favour of this, that no one can be so much master of the subject as the person himself: and besides, there are many instances, both ancient and modern, to justify such a conduct. But on the other hand it must be owned, that there are many inconveniencies which attend it; some of which are mentioned by Cicero. "If (says he) there is any thing commendable, persons are obliged to speak of themselves with greater modesty, and to omit what is blameable in others. Besides, what is said is not so soon credited, and has less authority; and after all, many will not stick to censure it." *Ad Fam. lib. v. ep. 12.* And Pliny says what is to the same purpose, "Those who proclaim their own virtues, are thought not so much to proclaim them because they did them, as to have done them that they might proclaim them. So that which would have appeared great if told by another, is lost when related by the party himself. For when men cannot deny the fact, they reflect upon the vanity of its author. Wherefore, if you do things not worth mentioning, the actions themselves are blamed; and if the things you do are commendable, you are blamed for men-

tioning them." *Lib. viii. Ep. 1.* These reflections will be generally allowed to be very just; and yet considering how natural it is for men to love themselves, and to be inclined in their own favour, it seems to be a very difficult task for any one to write an impartial history of his own actions. There is scarce any treatise of this kind that is more celebrated than Cæsar's Commentaries. And yet Suetonius tells us, that "Asinius Pollio (who lived at that time) thought they were neither written with due care nor integrity: that Cæsar was often too credulous in his accounts of what was done by other persons; and misrepresented his own actions, either designedly, or through forgetfulness: and therefore he supposes he would have reviled and corrected them." However, at some times it may doubtless be justifiable for a person to be his own historian. Plutarch mentions two cases wherein it is allowable for a man to commend himself, and be the publisher of his own merits. These are, when the doing of it may be of considerable advantage either to himself or others. It is indeed less invidious for other persons to undertake the province. And especially for a person to talk or write of his own virtues, at a time when vice and a general corruption of manners prevails, let what he says be ever so true, it will be apt at least to be taken as a reflection upon others. "Anciently (says Tacitus), many wrote their own lives, rather as a testimony of their conduct than from pride." Upon which he makes this judicious remark: "That the more virtue abounds, the sooner the reports of it are credited." But the ancient writers had a way of taking off the reader's attention from themselves in recording their own actions, and so rendering what they said less invidious: and that was, by speaking of themselves in the third person, and not in the first. Thus Cæsar never says, "*I* did," or, "*I* said, this or that;" but always *Cæsar* did, or said, so and so." Why the moderns have not more chosen to follow them in this, we know not, since it seems less exceptionable.

2. In a continued history of *particular* states, some account may be given of their original, and founders; the nature of their soil, and situation; what advantages they have for their support or improvement, either within themselves, by foreign traffic, or conquests; with the form of their government. Then notice should be taken of the methods by which they increased in wealth or power, till they gradually advanced to their highest pitch of grandeur; whether by their virtue, the goodness of their constitution, trade, industry, wars, or whatever cause. After this the reasons of their declensions should be shown; what were the vices that principally occasioned it (for that is generally the case); whether avarice, ambition, luxury, discord, cruelty, or several of these in conjunction. And lastly, where that has been their unhappy fate, how they received their final ruin and subversion. Most of these things Livy had in view when he wrote his history of the Roman state, as he acquaints his readers in the preface. "The accounts (says he) of what happened either before or while the city was building, consisting rather of poetical fables than any certain records of facts, I shall neither assert nor confute them. Let antiquity be allowed to make the origin of their cities more venerable, by uniting things human and divine. But if any nation may be suffered to fetch their origin from the gods, such is the military glory of the Romans, that when they represent Mars as the father of their founder, other nations may as easily acquiesce in this as they do in their government. But I lay no great stress upon these things, and others of the like nature, whatever may be thought of them. What I am desirous every one should carefully attend to, are our lives and manners: by what men, and what arts, civil and military, the empire was both acquired and enlarged: then let him observe, how our manners gradually declined with our discipline; afterwards grew worse and worse; and at length so far degenerated, that at present we can neither

bear with our vices, nor suffer them to be remedied. 'This is the chief benefit and advantage to be reaped from history, to fetch instruction from eminent examples of both kinds; in order to imitate the one, which will be of use both to yourself and your country, and avoid the other, which are equally base in their rise and event.'" Thus far Livy. And how well he has executed this design, must be acknowledged by all who will be at the pains to peruse his work.

3. But as a particular history consists in a number of facts relating to the same state, suitably connected and laid together in a proper series; so a *general* history is made up of several particular histories, whose separate transactions within the same period of time, or part of it, should be so distinctly related as to cause no confusion. Such was the history of Diodorus Siculus, which contained an account of most of the eminent states and kingdoms in the world, though far the greatest part of it is now unhappily lost. Of the same nature is the history of Herodotus, though not so extensive; to whom we are especially indebted for the Persian affairs. And to this kind may likewise be referred Justin's history, though it be only the epitome of a larger work written by another hand. The rules proper for conducting such histories are much the same as those above mentioned concerning particular histories; excepting what relates to the *order*, of which we shall have occasion to speak hereafter.

But the histories both of particular states and those which are more general frequently contain only the affairs of some short period of time. Thus the history of the Peloponnesian war, written by Thucydides, comprises only what was done in the first twenty years of that war, which lasted seven years longer than his account reaches; though indeed the reason of that might be, because Thucydides died before the war was finished, otherwise he would very probably have continued his history to the conclusion of it. But the history of the war between the Romans and king Jugurtha in Africa, given us by Sallust, as also Cæsar's histories of the Gallic and civil wars, are all confined within a much less number of years than that of Thucydides. Nay, sometimes one single transaction is thought sufficient to furnish out an history. Such was the conspiracy of Catiline to subvert the Roman state, written likewise by Sallust. As to more general histories, Xenophon's history of Greece may be esteemed as such; which in order of time succeeds that of Thucydides, and contains the affairs of forty-eight years. And Polybius called his a *general history*; which, though it principally contained the Roman affairs, yet took in the most remarkable transactions of several other states, for the space of fifty-three years: though it has met with the same hard fate as that of Diodorus Siculus, so that only the first five books out of forty, of which it consisted at first, now remain entire. And to mention no more, the celebrated history of Thuanus is another instance of this sort, in which the principal transactions of Europe for about 60 years, chiefly in the 16th century, are described with that judgment and fidelity, and in a manner so accurate and beautiful, that he has been thought scarcely inferior to any of the ancient historians. Now, in such histories as these, to go farther back than is necessary to set the subject in a just light, seems as improper as it is unnecessary.

The general subject or argument of history, in its several branches, may be reduced to these four heads; *narration, relation, speeches, and digressions.*

1. By *NARRATION* is meant a description of facts or actions, with such things as are necessarily connected with them; namely, persons, time, place, design, and event.

As to *actions* themselves, it is the business of the historian to acquaint his readers with the manner in which they were performed; what measures were concerted on all sides, and how they were conducted, whether with vigilance, courage, pra-

dence, and caution, or the contrary, according to the nature of the action; as likewise, if any unforeseen accidents fell out, by which the designed measures were either promoted or impeded. All actions may be referred to two heads, military and civil. And as war arises from injustice and injuries received on one side or the other, it is fit the reader should be informed who were the aggressors. For though war is never to be desired, yet it is sometimes necessary. In the description of battles, regard should be had equally to both parties; the number of forces, conduct of the generals, in what manner they engaged, what turns and chances happened in the engagement, either from accidents, courage, or stratagem, and what the event. The like circumstances should all be observed in sieges and other actions. But the most agreeable scene of history arises from a state of peace. Here the writer acquaints us with the constitution of states, the nature of their laws, the manners and customs of the inhabitants, the advantages of concord and unanimity, with the disadvantages of contention and discord; the invention of arts and sciences, in what manner they were improved and cultivated, and by whom; with many other things, both pleasant and profitable in the conduct of human affairs.

As to *persons*, the characters of all those should be described who act any considerable part in an history. This excites the curiosity of the reader, and makes him more attentive to what is said of them; as every one is more inquisitive to hear what relates to others in proportion to his knowledge of them. And it will likewise be of use to observe, how their actions agree with their characters, and what were the effects of their different qualifications and abilities.

The circumstances of *time* and *place* are carefully to be regarded by an historian, without which his accounts of facts will be frequently very lame and imperfect. And therefore chronology and geography seem not improperly to have been called *the two eyes of history*. Besides, they very much assist the memory: for it is much easier to remember any thing said to be done at such a time, and in such a place, than if only related in general; nay, the remembrance of these often recalls those things to mind which otherwise had been obliterated. By time is meant not only the year of any particular era or period; but likewise the season, as summer or winter; and the age of particular persons. For it is oftentimes from hence that we are principally enabled to make a just estimate of facts. Thus Cicero commends Pompey for undertaking and finishing the Piratic war at a season of the year when other generals would not have thought it safe to venture out at sea. This double danger, as well from the weather as the enemy, considering the necessity of the case, heightens the glory of the action; since to have done the same thing in summer would not have been an equal proof of the courage and intrepidity of the general. And there is nothing more surprising in the conquests of Alexander than that he should subdue so large a part of the world by the time he was little more than 30 years old; an age at which few other generals have been much distinguished. Had we not known this, a considerable part of his character had been lost.

The like advantages arise from the other circumstances of place. And therefore in marches, battles, and other military actions, the historian should take notice of the nature of the country, the passes, rivers, distances of places, situation of the armies, and strength of the towns either by nature or art; from which the reader may the better form a judgment of the difficulties and greatness of any enterprise. Cæsar is generally very particular in these things, and seems to have thought it highly requisite in order to give his readers a just idea of his actions. The descriptions of countries, cities, and rivers, are likewise both useful and pleasant; and help us to judge of the probability of what is related concerning the temper and genius

of the inhabitants, their arts, traffic, wealth, power, or whatever else is remarkable among them.

But an accurate historian goes yet further, and considers the *causes* of actions, and what were the *designs* and views of those persons who were principally concerned in them. Some, as Polybius has well observed, are apt to confound the beginnings of actions with their springs and causes, which ought to be carefully separated. For the causes are often very remote, and to be looked for at a considerable distance from the actions themselves. Thus, as he tells us, some have represented Hannibal's besieging Saguntum in Spain, and passing the Ebro, contrary to a former agreement between the Romans and Carthaginians, as causes of the second Punic war. But these were only the beginnings of it. The true causes were the jealousies and fears of the Carthaginians from the growing power of the Romans; and Hannibal's inveterate hatred to them, with which he had been impressed from his infancy. For his father, whom he succeeded in the command of the Carthaginian army, had obliged him, when but nine years old, to take a most solemn oath upon an altar never to be reconciled to the Romans: and therefore he was no sooner at the head of the army, than he took the first opportunity to break with them. Again, the true springs and causes of actions are to be distinguished from such as are only feigned and pretended. For generally the worse designs men have in view, the more solicitous they are to cover them with specious pretences. It is the historian's business, therefore, to lay open and expose to view these arts of politicians. So, as the same judicious historian remarks, we are not to imagine Alexander's carrying over his army into Asia to have been the cause of the war between him and the Persians. That had its being long before. The Grecians had formerly two armies in Asia, one under Xenophon, and the other commanded by Agesilaus. Now the Asiatics did not venture to oppose or molest either of these armies in their march. This made king Philip, Alexander's father, who was an ambitious prince, and aspired after universal monarchy, think it might be a practicable thing to make a conquest of Asia. Accordingly, he kept it in his view, and made preparations for it; but did not live to execute it. That was left for his son. But as king Philip could not have done this without first bringing the other states of Greece into it, his pretence to them was only to avenge the injuries they had all suffered from the Persians; though the real design was an universal government, both over them and the Persians, as appeared afterwards by the event. But in order to our being well assured of a person's real designs, and to make the accounts of them more credible, it is proper we should be acquainted with his disposition, manners, way of life, virtues, or vices; that by comparing his actions with these, we may see how far they agree and suit each other. For this reason Sallust is so particular in his description of Catiline, and Livy of Hannibal; by which it appears credible, that the one was capable of entering into such a conspiracy against his country, and the other of performing such great things as are related concerning him. But if the causes of actions lie in the dark, and unknown, a prudent historian will not trouble himself or his readers with vain and trifling conjectures unless something very probable offers itself.

Lastly, an historian should relate the *issue* and *event* of the actions he describes. This is undoubtedly the most useful part of history; since the greatest advantage arising from it is to teach us experience from what has happened in the world before us. When we learn from the examples of others the happy effects of wisdom, prudence, integrity, and other virtues, it naturally excites us to an imitation of them, and to pursue the same measures in our own conduct. And, on the contrary, by perceiving the unhappy consequences which have followed from violence, deceit, rashness, or the like vices, we are deterred from

such practices. But since the wisest and most prudent measures do not always meet with the desired success, and many cross accidents may happen to frustrate the best-concerted designs; when we meet with instances of this nature, it prepares us for the like events, and keeps us from too great a confidence in our own schemes. However, as this is not commonly the case, but in the ordinary course of human affairs like causes usually produce like effects; the numerous examples of the happy consequences of virtue and wisdom recorded in history are sufficient to determine us in the choice of our measures, and to encourage us to hope for an answerable success, though we cannot be certain we shall in no instance meet with a disappointment. And therefore Polybius very justly observes, that "he who takes from history the causes, manner, and end of actions; and omits to take notice whether the event was answerable to the means made use of, leaves nothing in it but a bare amusement, without any benefit or instruction." These, then, are the several things necessary to be attended to in historical narrations; but the proper disposition of them must be left to the skill and prudence of the writer.

2. REFLECTIONS made by the writer have been condemned by many, as having a tendency to bias the reader; who should be left to draw such conclusions from the accounts of facts as he sees proper. But since all readers are not capable of doing this for themselves, what disadvantage is it for the author to suggest to them such observations as may assist them to make the best use of what they read? And if the philosopher is allowed to draw such inferences from his precepts as he thinks just and proper, why has not the historian an equal right to make reflections upon the facts he relates? The reader is equally at liberty to judge for himself in both cases, without danger of being prejudiced. And therefore we find, that the best historians have allowed themselves this liberty. It would be easy to prove this by a large number of instances, but one or two here may suffice. After Sallust has given a very distinct account of the designs of Catiline, and of the whole scheme of the conspiracy, he concludes it with this reflection: "All that time the empire of the Romans seems to me to have been in a very unhappy state. For when they had extended their conquests through the whole world from east to west, and enjoyed both peace and plenty, which mankind esteem their greatest happiness; some persons were obstinately bent upon their own ruin, and that of their country. For notwithstanding two decrees were published by the senate, not one out of so great a multitude was prevailed with, by the rewards that were offered, either to discover the conspiracy or to leave the army of Catiline—So desperate a disease, and as it were infection, had seized the minds of most people!" *Bell. Catil. c. 37.* And it is a very suitable observation that Livy makes upon the ill-conduct of Hannibal in quartering his army in Capua after the battle of Cannæ; by which means they lost their martial vigour through luxury and ease. "Those (says he) who are skilled in military affairs reckon this a greater fault in the general, than his not marching his army immediately to Rome after his victory at Cannæ; for such a delay might have seemed only to defer the victory, but this ill step deprived him of the power to gain it." *Lib. xxiii. c. 18.* The modesty of the historian in this passage is worth remarking, in that he does not represent this as his own private opinion, and by that means undertake to censure the conduct of so great a general as Hannibal was, but as the sense of those who were skilled in such affairs. However, an historian should be brief in such remarks; and consider, that although he does not exceed his province by applauding virtue, expressing a just indignation against vice, and interposing his judgment upon the nature and consequences of the facts he relates; yet there ought to be a difference between his reflections and the encomiums or declamations of an orator.

3. SPEECHES inserted by historians are of two sorts, namely, oblique and direct. The former are such as the historian recites in his own person, and not in that of the speaker. Of this kind is that of Hannibal in Justin; by which he endeavours to persuade king Antiochus to carry the seat of the war against the Romans into Italy. It runs thus: "Having desired liberty to speak (he said), none of the present counsels and designs pleased him; nor did he approve of Greece for the seat of the war, which might be managed in Italy to greater advantage: because it was impossible to conquer the Romans but by their own arms, or to subdue Italy but by its own forces; since both the nature of those men, and of that war, was different from all others. In other wars, it was of great importance to gain an advantage of place or time, to ravage the countries and plunder the towns; but though you gain some advantage over the Romans, or defeat them, you must still fight with them when beaten. Wherefore, should any one engage with them in Italy, it was possible for him to conquer them by their own power, strength, and arms, as he himself had done; but should he attempt it out of Italy, the source of their power, he would be as much deceived, as if he endeavoured to alter the course of a river, not at the fountain-head, but where its streams were largest and deepest. This was his judgment in private, and what he had offered as his advice, and now repeated in the presence of his friends; that all might know in what manner a war ought to be carried on against the Romans, who were invincible abroad, but might be conquered at home. For they might sooner be driven out of their city than their empire, and from Italy than their province; having been taken by the Gauls, and almost subdued by himself. That he was never defeated till he withdrew out of their country; but upon his return to Carthage, the fortune of the war was changed with the place."—*Lib. xxxi. c. 5.* He seems to intimate by this speech, that the Romans were like some fierce and impetuous animals, which are no otherwise to be subdued than by wounding them in some vital part. In speeches related after this manner, we are not necessarily to suppose the historian gives us the very words in which they were at first delivered, but only the sense. But in direct speeches, the person himself is introduced as addressing his audience; and therefore the words as well as the sense are to be suited to his character. Such is the speech of Eumenes, one of Alexander's captains and successors, made to his soldiers when they had traitorously bound him in chains, in order to deliver him up to his enemy Antigonus, as we have it in the same writer. "You see, soldiers (says he), the habits and ornaments of your general, which have not been put upon me by mine enemies; that would afford me some comfort: it is by you, that of a conqueror I am become conquered, and of a general a captive; though you have sworn to be faithful to me four times within the space of a year. But I omit that, since reflections do not become persons in calamity. One thing I entreat, that, if Antigonus must have my life, you would let me die among you. For it no way concerns him how or where I suffer, and I shall escape an ignominious death. If you grant me this, I free you from your oath, with which you have been so often engaged to me. Or, if shame restrains you from offering violence to me at my request, give me a sword, and suffer your general to do that for you without the obligation of an oath which you have sworn to do for your general." *Lib. 14. c. 4.*

But this likewise is a matter in which critics have been divided in their sentiments; whether any, or what kind, of speeches ought to be allowed in history. Some have thought all speeches should be excluded: and the reason given for that opinion is this; that it breaks the thread of the discourse, and interrupts the reader, when he is desirous to come to the end of an action, and know how it issued. This is true, indeed, when speeches are either very long or too frequent; but otherwise

they are not only entertaining, but likewise instructive. For it is of service to know the springs and reasons of actions; and these are frequently opened and explained in the speeches of those by whom they were performed. Others therefore have not been against all speeches in general, but only direct ones. And this was the opinion of Trogius Pompeius, as Justin informs us; though he did not think fit to follow him in that opinion, when he abridged him, as we have seen already by the speech of king Eumenes. The reason offered against direct speeches is, because they are not true; and truth is the foundation of all history, from which it ought never to depart. Such speeches, therefore, are said to weaken the credit of the writer; since he who will tell us that another person spoke such things which he does not know that he ever did speak, and in such language as he could not use, may take the same liberty in representing his actions. Thus, for example, when Livy gives us the speeches of Romulus, the Sabine women, Brutus, and others, in the first ages of the Roman state, both the things themselves are imaginary, and the language wholly disagreeable to the times in which those persons lived. Accordingly we find, that when several historians relate some particular speech of the same person, they widely differ both in the subject-matter and expressions. So the speech of Veturia, by which she dissuaded her son Coriolanus from besieging Rome, when he came against it with an army of Volscians to avenge the injuries he had received, is very differently related by Livy, Dionysius of Halicarnassus, and Plutarch. Such fictitious speeches therefore are judged more fit for poets, who are allowed a greater liberty to indulge their fancy than historians. And if any direct speeches are to be inserted, they should be such only as were really spoken by the persons to whom they are ascribed, where any such have been preserved. These have been the sentiments of some critics both ancient and modern. See Voss. *Ars Hist.* c. 20. However, there is scarce an ancient historian now extant, either Greek or Latin, who has not some speeches, more or less, in his works; and those not only oblique, but also direct. They seem to have thought it a necessary ornament to their writings: and even where the true speeches might be come at, have chosen rather to give them in their own words; in order, probably, to preserve an equality in the style. Since therefore the best and most faithful historians have generally taken this liberty, we are to distinguish between their accounts of facts and their speeches. In the former, where nothing appears to the contrary, we are to suppose they adhere to truth, according to the best information they could get; but in the latter, that their view is only to acquaint us with the causes and springs of actions, which they chose to do in the form of speeches, as a method most ornamental to the work, and entertaining to the reader: though the best historians are cautious of inserting speeches, but where they are very proper, and upon some solemn and weighty occasions. Thucydides is said to have been the first who brought complete and finished speeches into history, those of Herodotus being but short and imperfect. And though Dionysius of Halicarnassus, in his censure upon Thucydides, seems then to have disliked that part of his conduct; yet he afterwards thought fit to imitate it in his *Antiquities of Rome*, where we find many not only oblique, but also direct orations.

What has been said of speeches, may likewise be understood of letters, which we sometimes meet with in histories; as that of Alexander to Darius in Q. Curtius, those of Tiberius and Drusus in Tacitus, and many others. Some letters are wholly fictitious; and in others perhaps the historian represents the substance of what was really said, but gives it his own dress. Thus we find that short letter of Lentulus to Catiline at the time of his conspiracy differently related by Cicero and Sallust.

The reason of which seems to be this: That as Cicero recited it publicly to the people of Rome in his third oration against Catiline, it is reasonable to imagine he did it in the very words of the letter which he had by him: whereas Sallust, as an historian, might think it sufficient to give the sense of it in his own words.

4. **DIGRESSIONS.** These, if rightly managed, afford the reader both delight and profit. Like speeches, they should neither be too long nor frequent; lest they interrupt the course of the history, and divert the reader from the main design of the work. But now and then to introduce a beautiful description, or some remarkable incident, which may give light to the subject, is so far from an interruption, that it is rather a relief to the reader, and excites him to go on with greater pleasure and attention. See further on this head, the article **ORATORY**.

SECT. III. *Of Order.*

SINCE most histories consist of an introduction and the body of the work, in each of which some order is requisite, we shall speak of them separately.

1. The design of the introduction is the same here as in orations. For the historian proposes three things by his introduction, which may be called its parts; to give his reader some general view of the subject, to engage his attention, and to possess him with a candid opinion of himself and his performance. Some have thought this last unnecessary for an historian; but if we consider how differently mankind are apt to judge of the same persons and actions, it seems as requisite for an historian to be well esteemed as an orator; and therefore we find some of the best historians have not omitted this part. Livy's introduction has been very much applauded by the learned, as a master-piece in its kind. It begins with an account of his design. "Whether (says he) it may answer any valuable end for me to write the history of the Roman affairs from the beginning of the city, I neither am certain, nor if I was should I venture to declare it." Soon after he endeavours to prepare the reader's attention, by representing the grandeur and usefulness of the subject in the following words: "Either I am prejudiced in favour of my subject, or there never was any state greater, more virtuous, and fruitful of good examples, or in which avarice and luxury had a later admittance, or poverty and thriftiness were either more highly or longer esteemed, they always coveting less the less they enjoyed." And then he presently proceeds to ingratiate himself with his readers, and gain their favourable opinion: "Although my name is obscure in so great a number of writers, yet it is a comfort that they cloud it by their fame and character. But I shall gain this advantage by my labour, that I shall be diverted for a time from the prospect of those evils which the age has seen for so many years; while my mind is wholly intent upon former times, free from all that care which gives the writer an uneasiness, though it cannot bias him against the truth." In this passage we see he endeavours to gain the good esteem of his readers from two very powerful motives, modesty and a strict regard to truth. It may scarce seem necessary to observe, that those introductions are esteemed the best which are most natural; that is, such as are taken from the subject-matter of the history itself, and closely connected with it. Such are those of Herodotus, Thucydides, Livy, Tacitus, and others. And therefore Sallust is greatly blamed by Quintilian on the account of his introductions, which are so general, that they might suit other histories as well as those to which they are prefixed. Introductions should likewise be proportioned to the length of the work. We meet with some few histories, in which the writers immediately enter upon their subject, without any introduction; as Xenophon in his

Expedition of the younger Cyrus, and Cæsar in his Commentaries of the Gallic and Civil Wars. But the latter does not profess to write a just history; and therefore left himself more at liberty, as well in this respect as in some others.

2. But order is principally to be regarded in the body of the work. And this may be managed two ways; either by attending to the time in a chronological series, or the different nature and circumstances of the things contained in the history. However, as these two methods do not equally suit all subjects, we shall a little consider to what kind of histories each of them seems more properly adapted. All history then, as we have observed already, may be reduced to three sorts; *biography*, the *history of particular states*, and the *general history of several states* existing at the same time.

In biography, or the lives of particular persons, most writers follow the order of time; though some reduce them to certain general heads, as their virtues and vices, or their public and private character. Plutarch and Cornelius Nepos have taken the former method, and Suetonius the latter.

As to the history of particular states, the order of time is generally best, as being most natural and easy. And therefore it has usually been observed by the best historians, as Thucydides, Livy, and others. Tacitus, indeed, wrote two distinct works; one of which he called *Annals*, and the other *Histories*. And as in both he has kept to the order of time, critics have been at a loss to assign any other reason for these different titles, unless that in the former work he confines himself more closely to the facts themselves, and does not treat so largely upon the causes, manner, or event of them, as he has done in the latter. And even in the circumstances of facts, there is a certain order proper to be observed, for rendering the account more plain and intelligible. Thus, for instance, in the description of a battle or siege, the time should first be known, then the chief person or persons who conducted it, then the number of forces, and other requisites, afterwards the nature of the place, then the action itself, and lastly the event. But sometimes it is necessary to add the time in which several of the other circumstances happened, especially in actions of any considerable length. Where the order of these circumstances is confused, it perplexes the account, and renders it both less entertaining to the reader, and more difficult to remember.

In a general history, the order of time cannot always be preserved; though, where the actions of different communities have respect to one as the principal, they should all, as far as possible, be referred to the transactions of that state. But even here the several affairs of those different states ought to be related separately, which will necessarily occasion the anticipating some things, and postponing others, so that they cannot all stand in the order of time in which they were performed. However, Velleius Paterculus says very justly with regard to this subject, "That every entire action, placed together in one view, is much better apprehended than if divided by different times." In this case, therefore, for better preserving the chronology, it is usual with historians, when they have finished any particular narrative, in passing to the next, to express the time by some short and plain transition; and sometimes to apologize for themselves, by assigning the reasons of their conduct. So Polybius, whose history is of this kind, says concerning himself: "As in writing the actions of each year, in the order of time, I endeavour to represent the affairs of the same nation together in one summary view, it is plain that inconvenience must of course attend this way of writing." Curtius professes only to write the actions of Alexander king of Macedon; but his history contains in it the principal affairs of the greatest states in the world during that period. Now although, in the course of those transactions, the war between Archelaus governor of Macedonia and Agis king of Sparta happened

before the battle of Alexander at Arbela; yet the historian not only relates that battle first, but carries on the account of Alexander's affairs in Asia to the death of Darius without interruption; for which he gives this reason: "If I should relate the affairs of Alexander, which happened in the mean time, either in Greece or Illyrium and Thrace, each in their proper order and time, I must interrupt the affairs of Asia; which it is much better to represent together in one continued series as they fell out, to the flight and death of Darius." *Lib. v. init.* Such anachronisms, therefore, are nothing more than what necessarily arise sometimes from the nature of the subject: as every thing, the more complex it is, and containing under it a greater number of parts, is more difficult to be digested in a regular order. But in an history composed of several states, whose affairs are independent of one another, the actions of each nation must necessarily be separated, in order to represent them in a just view, and prevent confusion. This is the method which Herodotus has taken, as likewise Diodorus Siculus and Justin. Now both the pleasure and benefit which such histories afford, arise from observing the conduct of each state separately in the course of their affairs, and then comparing one with the other. And as the order of time must frequently be interrupted, it is not unusual to continue the chronology at proper distances in relating the affairs of each nation; which preserves an unity in the whole, and connects it in one consistent body.

The division of histories into books was designed only for the better distinction of the subject and ease of the reader. The dividing these books again into chapters, is rather a practice of later editors (founded, as they have thought, on the same reasons) than countenanced by the example of ancient writers.

SECT. IV. Of Style.

AN historical style is said to be of a middle nature, between that of a poet and an orator, differing from both not only in the ornamental parts, but likewise in the common idioms and forms of expression.

Cicero observes, (*De Clar. Orat. c. 75*), that "nothing is more agreeable in history than brevity of expression, joined with purity and perspicuity." Purity indeed is not peculiar to history, but yet is absolutely necessary; for no one will ever think him fit to write an history who is not master of the language in which he writes: and therefore when Albinus had written an history of the Roman affairs in Greek, and apologized for any slips or improprieties that might be found in the language upon the account of his being a Roman, Cato called him a trifler, for choosing to do that which, after he had done it, he was obliged to ask pardon for doing. Nor is perspicuity less requisite in an historical style. The nature of the subject plainly directs to this. For as history consists principally in narration, clearness and perspicuity is nowhere more necessary than in a relation of facts. But these two properties are to be accompanied with brevity, since nothing is more disagreeable than a long and tedious narrative. And in this respect an historical style differs both from that of poetry and oratory. For the poet frequently heightens and enlarges his descriptions of facts, by dwelling upon every circumstance, placing it in different views, and embellishing it with the finest ornaments of wit and language, to render his images more agreeable; and the orator often does the like, with a design to interest the passions. But such colouring is not the province of an historian, who aims at nothing more than a just and faithful representation of what he relates, in a way best suited to its nature, and in such language as is most proper to set it in a plain and satisfactory light.

Again, Cicero, (*De Orat. lib. ii. c. 15. 20*), treating of an historical style, says: "It ought to be fluent, smooth, and

even; free from that harshness and poignancy which is usual at the bar." The properties here mentioned distinguish this style from that of judicial discourses, in which the orator often finds it necessary to vary his manner of speaking, in order to answer different views, either of pursuing an argument, pressing an adversary, addressing a judge, or recommending the merits of his cause. This occasions an inequality in his style, while he speaks sometimes directly, at other times by way of question, and intermixes short and concise expressions with round and flowing periods. But the historian has no necessity for such variations in his style. It is his province to espouse no party, to have neither friend nor foe, but to appear wholly disinterested and indifferent to all; and therefore his language should be smooth and equal in his relations of persons and their actions.

But further: Dionysius (*Epist. ad Cu. Pompeium*) makes "decency a principal virtue in an historian;" which he explains by saying, that "he ought to preserve the characters of the persons and dignity of the actions of which he treats." And to do this it seems necessary that an historical style should be animated with some degree of life and vigour; without which neither the characters of eminent persons, nor their remarkable actions, which make up the main business of history, can be duly represented: for even things in themselves great and excellent, if related in a cold and lifeless manner, often do not affect us in a degree suitable to their dignity and importance. And this seems particularly necessary in speeches, in order to represent what every one says, according to his different country, age, temper, and station of life, in the same manner we may suppose he either really did, or would have spoken himself on that occasion. Besides, there are some scenes of action which require very pathetic and moving language to represent them agreeably to their nature: and in descriptions, the most beautiful tropes and lively figures are often necessary to set the ideas of things in a proper light. From whence it appears, that painting and imagery make up no small part of the historian's province, though his colours are not so strong and glittering as those either of the poet or orator. He ought therefore to be well acquainted with the manners of men and the nature of the passions, since he is often obliged to describe both; in the former of which Herodotus excels, and Thucydides in the latter, as Dionysius has observed,

Now from these several properties laid down by ancient writers, as requisite for an historical style, it seems upon the whole to agree best with the middle character. And this will further appear, by what they say relating to the ornamental parts of style; namely, composition and dignity. As to the former of these, which respects the structure of sentences, and the several parts of them, Demetrius remarks, that "An historical period ought neither to rise very high, nor sink very low, but to preserve a medium." This simplicity (he says) "becomes the gravity and credit of history; and distinguishes it from oratory on the one hand, and dialogue on the other." His meaning is, that historical periods should neither be so full and sonorous as is frequent in oratory; nor yet so short and flat as in dialogue: the former of which, as he says, require a strong voice to pronounce them; and the latter have scarce the appearance of periods. So that according to this judicious writer, the periods best suited for history are those which, being of a moderate length, will admit of a just rise and cadency, and may be pronounced with ease. And Dionysius tells us, that "History should flow smooth and even, every where consistent with itself, without roughness or chafms in the sound." This relates to the harmony of periods, which arises from such a position of the words, as renders the sound pleasant and agreeable, and, as he thinks, ought to be attended

to in history. And as to dignity, which respects the use of tropes and figures, the same author says, that "History should be embellished with such figures as are neither vehement nor carry in them the appearance of art." This is agreeable to what Cicero observes, in comparing Xenophon and Calisthenes, two Greek historians. "Xenophon the Socratic (says he) was the first philosopher, and after him Calisthenes, the scholar of Aristotle, who wrote an history: the latter almost like a rhetorician; but the style of the former is more moderate, and has not the force of an orator, less vehement perhaps, but in my opinion more sweet and pleasant." The difference between these two writers, with regard to their style, consisted chiefly in the choice of their figures; which in Xenophon were more gentle and moderate, and therefore in the judgment of Cicero more agreeable to history.

But notwithstanding this general account of the several properties which constitute an historical style, it admits of considerable varieties from the different nature and dignity of the subject. The lives of particular persons do not require such strength and majesty of expression, nor all those ornaments of language, as an history of the Roman empire. And accordingly we find the style of Nepos and Suetonius very different from that of Livy. The former is smooth and easy, scarce rising above the low character: but the latter often approaches near to the sublime; and other historians again have kept a medium between these. Upon the whole, therefore, we may conclude, that the middle style is the proper character for history; though historians may sometimes sink into the low character, and at other times rise to the grandeur and magnificence of the sublime, from the different nature of their subject, or of particular parts of it: for that is to be esteemed the proper character of any writing which in general best suits it. And this distinction may help us in some measure to reconcile the sentiments of writers upon this head who seem to attribute different characters to an historical style, or at least to judge where the truth lies; since a variety of style is not only requisite in different subjects, but likewise in different parts of the same work.

EXPLANATION OF THE CHART OF HISTORY.

By the plan set forth in plate II. events may be referred to the year of the world; and, within the proper periods, to the areas of the Olympiads, of Nabonassar, and of Rome; but the principal reference is to the birth of Christ, marked by a deep black line.

The plan extends only to the Flood; the preceding period of 1656 years is therefore left blank in the chart.

There being 2348 years from the Flood to the birth of Christ, the space between them is divided into 23 parts, each representing an hundred years or century, and a fraction representing the remaining 48 years.

As we are now in the 18th century, the space from the birth of Christ downwards is divided into eighteen parts or centuries: and all these parts, together with some centuries preceding the birth of Christ, are subdivided into tens.

The vertical columns, titled at top, are geographical divisions; and events are marked in their proper centuries and proper columns. Thus the rise of any state, as that of Assyria, is marked in its proper geographical column, and in that place of the 21st century before Christ at which the beginning of its history is dated; from thence we trace its continuance to the end of the 7th century before Christ, when it became extinct. The building of Rome is marked about the middle of the 8th century before Christ. Its territory extends by degrees to the conquest of all Italy; next to Spain, Macedonia, &c. until it comes to extend from Britain to Egypt. It con-

CHART: *Representing one line the use of property of the principal. Notes: 1. Property of the household.*

GERMAN		BRITISH ISLANDS		GAIL		ITALY		SPAIN		GREECE		ASIA		AFRICA		AMERICA	
AM		DELUGE		PERIOD OF 1000 YEARS		BEFORE THE		F L O O D									
1	1700																AM
2	1800																18-16
3	1900																23
4	2000																22
5	2100																21
6	2200																20
7	2300																19
8	2400																18
9	2500																17
10	2600																16
11	2700																15
12	2800																14
13	2900																13
14	3000																12
15	3100																11
16	3200																10
17	3300																9
18	3400																8
19	3500																7
20	3600																6
21	3700																5
22	3800																4
23	3900																3
24	4000																2
25	4100																1
26	4200																1
27	4300																1
28	4400																1
29	4500																1
30	4600																1
31	4700																1
32	4800																1
33	4900																1
34	5000																1
35	5100																1
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42	5800																1
43	5900																1
44	6000																1
45	6100																1
46	6200																1
47	6300																1
48	6400																1
49	6500																1
50	6600																1
51	6700																1
52	6800																1
53	6900																1
54	7000																1
55	7100																1
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57	7300																1
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64	8000																1
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75	9100																1
76	9200																1
77	9300																1
78	9400																1
79	9500																1
80	9600																1
81	9700																1
82	9800																1
83	9900																1
84	10000																1

Account of the
Arabian Peninsula
500

values of this greatness until about the middle of the 5th century after Christ, when it begins to lose those provinces out of which the modern kingdoms of Europe have been formed in the order here set down. As the order in which states have risen or fallen, relatively to one another, appears on mere inspection, it will be more easily remembered than when it is conveyed in numbers only.

The dates are taken chiefly from Blair's Chronological Tables. Use has likewise been made of the Chart of Universal History, formed on a design like this, but differently executed. Perhaps compared to that chart, the present may be thought incomplete; yet it would not have been difficult to have extended it considerably, and filled it up with remarkable events, successions of kings, and lives of great men; but clearness and simplicity seemed more an object, and therefore it was thought

proper to leave to every person the filling up of his own plan with such articles as are most in the way of his curiosity and study. We have given indeed a few specimens in the succession of the Roman emperors, of the kings of England and France; and in the lives of one or two remarkable men, as in those of Tacitus the historian, and Attila. One person may choose to fill his plan with the names of statesmen and warriors, another with scholars and men of letters. To attempt inserting all that deserve being recorded, however, would crowd and embarrass the whole.

As space is here employed to represent time, it is material that equal periods should be represented by equal spaces; and, if possible, that the parts of the same empire should be placed together. Both these circumstances are neglected in the Chart of Universal History.

H I T

HISTORY of Nature, or *Natural History*. See NATURAL History.

HISTRIO, in the ancient drama, signified an actor or comedian; but more especially a pantomime, who exhibited his part by gestures and dancing. Livy informs us, that the historians were brought to Rome from Etruria, in the year of the city 391, (Dec. i. lib. 7.)

HISTRIX. See HYSTRIX.

HITCHING, a large and populous town of Hertfordshire in England, situated near a large wood called *Hitchwood*. It is 15 miles W. N. W. of Hertford, and 34 N. W. of London. The manor was the ancient demesne of the kings of England, as it continues at this day; and it has been the dower of several of their queens. The town is reckoned the second in the county for number of streets, houses, and inhabitants. It was formerly famous for the staple commodities of the kingdom, and divers merchants of the staple of Calais resided here, since which that trade is lost. The inhabitants now make large quantities of malt; and the market is one of the greatest in England for wheat. W. lon. 0. 20. N. lat. 51. 55.

HITHE, a town of Kent in England, 70 miles from London. It is one of the cinque ports; and had formerly five parishes, but by the choaking up of its harbour and other accidents these are now reduced to one. In the reign of Henry IV. numbers of its inhabitants were cut off by a pestilence, 200 of their houses consumed by fire, and five of their ships sunk at sea, with the loss of 100 men; so that the people were going to abandon the town, had not the king by his charter generously released to them, for five turns next following, their service of five ships of 100 men and five horse, which they were to have furnished out and kept at their own charge in the king's wars for 15 days. It was first incorporated by the name of *barons of the town and port of Hith*; but the government was afterwards changed. It was incorporated by Queen Elizabeth with the name of the mayor, jurats, and commonalty of the town and port of Hith, who, with the freemen, elect the members of parliament. The mayor is chosen yearly on Candlemas-day. Here is a market on Saturdays, and fairs in July and December. From hence to Canterbury is a paved Roman military-way, called *Stoney-Street*; and at a little distance from hence are the remains of the walls of a castle, which included 10 acres. There is a remarkable pile of dry bones in the town, 28 feet long, 6 broad, and 8 high; they are kept in a vault under the church in as good order as books in a library, consisting of several thousand heads, arms, legs, thigh-bones, &c. some very gigantic, and appear by an inscription to be the remains of the Danes and Britons killed in a battle near this place, before

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H O A

the Norman conquest. From hence to Boulogne is reckoned the shortest cut to France. E. lon. 1. 17. N. lat. 51. 6.

HITTITES, the descendants of Heth the father of the Hittites. Heth was the eldest son of Canaan (Gen. x. 15.), and dwelt southward of the promised land, at Hebron, or thereabouts. Ephron, an inhabitant of Hebron, was of the race of Heth, and this whole city in Abraham's time was peopled by the children of Heth. There are some who maintained that there was a city called Heth, but we find no traces of it in the Scriptures.

HIVE, in country affairs, a convenient receptacle for bees. See APIS and BEE.

HIVITES, a people descended from Canaan. They dwelt at first in the country which was afterwards possessed by the Caphtorims, or Philistines. There were Hivites likewise at Shechem and Gibeon, and consequently in the centre of the promised land; for the inhabitants of Shechem and the Gibeonites were Hivites, (Josh. xi. 19. Gen. xxxiv. 12.) Lastly, there were some beyond Jordan, at the foot of mount Hermon, (Josh. xi. 3.) Bochart is of opinion, that Cadmus, who carried a colony of Phœnicians into Greece, was an Hivite. His name *Cadmus*, comes from the Hebrew *Kedem*, "the east," because he was of the eastern part of the land of Canaan. The name of his wife *Hermione*, comes from mount Hermon, at the foot whereof the Hivites had their dwelling. The metamorphosis of Cadmus's companions into serpents is grounded on the signification of the name *Hivites*, which in Phœnician signifies "serpents."

HOACHE, in natural history, a kind of earth approaching to the nature of chalk, but harder, and feeling like soap; whence some think that it is either the same with the soap-rock of Cornwall, or very like it. The Chinese dissolve it in water till the liquor is of the consistence of cream, and then varnish their China-ware with it.

HOADLEY (Benjamin), successively bishop of Bangor, Hereford, Salisbury, and Winchester, was born in 1676. His first preferment in the church was the rectory of St. Peter le Poor, and the lectureship of St. Mildred's in the Poultry. In the year 1706 he published some Remarks on the late bishop Atterbury's sermon at the funeral of Mr. Bennet, in which Dr. Atterbury had, in the opinion of Mr. Hoadley, laid down some dangerous propositions. Two years after, Mr. Hoadley again entered the lists against this formidable antagonist; and in his *exceptions* against a sermon published by Dr. Atterbury, intitled "The Power of Charity to cover Sin," he attacked the doctor with his usual strength of reasoning and dispassionate inquiry. In 1709 another dispute arose between these two

learned combatants, concerning the doctrine of non-resistance, occasioned by a performance of Mr. Hoadley's, intitled "The Measures of Obedience;" some positions in which Dr. Atterbury endeavoured to confute in his elegant Latin sermon, preached that year before the London clergy. In this debate Mr. Hoadley signalized himself in so eminent a degree, that the honourable house of commons gave him a particular mark of their regard, by representing, in an address to the queen, the signal services he had done to the cause of civil and religious liberty.—The principles, however, which he espoused being repugnant to the general temper of those times, drew on him the virulence of a party; yet it was at this period (1710, when, as he himself expressed it, *fiery seemed to be let loose upon him*) that the late Mrs. Howland presented him to the rectory of Streat-ham in Surry, unasked, unapplied to, and without his either having seen her or been seen by her. Soon after the accession of king George I. Mr. Hoadley was consecrated to the see of Bangor; and, 1717, having broached some opinions concerning the nature of Christ's kingdom, &c. he again became the object of popular clamour. At this juncture he was distinguished by another particular mark of the royal regard, by means of which the convocation was successively prorogued, and it was not permitted to sit, nor do any business, till that resentment was entirely subsided. In 1721 he was translated to Hereford; and from thence, in 1723, to Salisbury. In 1734 he was translated to Winchester (on the demise of Dr. Willis), and published his *Plain Account of the Sacrament*: a performance which served as a butt for his adversaries to shoot at, yet impartially owns it to be clear, rational, and manly, written with great candour and judgment, and suited to the capacity of every serious and considerate inquirer after truth.—His latter days were embittered by a most vile instance of fraud and ingratitude. The bishop took a French priest, who pretended to abjure his religion, under his protection, with no other recommendation than that of his necessities; in return for which act of humanity, the priest found an opportunity of getting the bishop's name written by his own hand, and, causing a note of some thousand pounds to be placed before it, offered it in payment. But the bishop denying it to be his, it was brought before a court of justice, and was there found to be a gross imposition. The ungrateful villain had now recourse to a pamphlet, in which he charged the bishop with being a drunkard; and alleged that he had the note of him when he was in liquor. To this calumny the bishop made a full and nervous answer; in which he exposed the man's falsehood, and solemnly averred that he was never drunk in his whole life. The world with becoming candour embraced his defence, and he had the happiness to find himself perfectly acquitted even of any suspicion of such a charge. As a writer, he possessed uncommon abilities. His sermons (published in 1754 and 1755) are esteemed inferior to few writings in the English language, for plainness and perspicuity, energy and strength of reasoning, and a free and masterly style. In private life, he was naturally facetious, easy, and complying; fond of company, yet would frequently leave it for the purposes of study or devotion. He was every where happy; and particularly in his own family, where he took all opportunities of instructing by his influence and example. He died in 1761, aged 83. Besides the works already mentioned, he wrote, 1. *Terms of Acceptance*, 8vo. 2. *Reasonableness of Conformity*. 3. *On the Sacrament*. His tracts and pamphlets are extremely numerous; and the reader may see a complete catalogue of them in his Life inserted in the Supplement to the *Biographia Britannica*.

HOADLEY (Benjamin, M. D.), son of the former, was born in 1706; and studied at Bennet-college Cambridge, under the tuition of Dr. Herring afterwards archbishop of Canterbury. He took his degree in physic; and particularly applying him-

self to mathematical and philosophical studies, was, when very young, admitted a member of the Royal Society. He was made register of Hereford while his father filled that see, and was early appointed physician to his majesty's household, but died at his house in Chelsea in 1757. He wrote, 1. *Three Letters on the organs of respiration*, 4to. 2. *The Suspicious Husband*, a comedy. 3. *Observations on a series of electrical experiments*; and, 4. *Oratio annivcrsaria, in Theatro Ch. Med. Londin. ex Harvey instituto habita die Oct. b. 1742*.

HOAI-NGAN FOU, a city of China, in the province of Hiang-nan. According to Grosier, it is situated in a marsh, and is enclosed by a triple wall. As the ground on which it stands is lower than the bed of the canal, the inhabitants live in continual dread of an inundation. The suburbs extend to the distance of a league on each side of the canal, and form at their extremity a kind of port on the river Hoang-ho. This place is very populous, and every thing in it announces an active and brisk trade. One of those great mandarins who have the inspection of the canals and navigation, and who are also obliged to supply the court with necessary provisions, resides here. This city has eleven other under its jurisdiction; two of which are of the second, and nine of the third class.

HOARSENESS, in medicine, a diminution or temporary loss of the voice, sometimes attended with a preternatural asperity or roughness of utterance. The parts affected are the trachea and larynx. It is occasioned by a slight inflammation of the mucous membrane covering those parts; and is relieved by mucilaginous linctuses; warm diluting drinks, such as bran tea, linseed tea, &c.; assisted by opiate and sudorific medicines taken at bed-time.

HOBAL, in mythology, an idol of the ancient Arabs, the worship of which at Mecca was destroyed by Mahomet.

HOBBS (Thomas), a famous writer, born at Malmesbury in 1588, was the son of a clergyman. He completed his studies at Oxford, and was afterwards governor to the eldest son of William Cavendish, earl of Devonshire. He travelled through France and Italy with that young nobleman, and at length applied himself entirely to the study of polite literature. He translated Thucydides into English; and published his translation in 1628, in order to show his countrymen, from the Athenian history, the disorders and confusions of a democratical government. In 1626 his patron the earl of Devonshire died; and in 1628 his son died also: which loss affected Mr. Hobbes to such a degree, that he very willingly accepted an offer made him of going abroad a second time with the son of Sir Gervase Clifton; whom he accordingly accompanied into France, where he staid some time. But while he continued there, he was solicited to return to England, and to resume his concern for the hopes of that family to whom he had attached himself so early, and to which he owed so many and so great obligations. In 1631 the countess dowager of Devonshire desired to put the young earl under his care, who was then about the age of 13. This was very suitable to Mr. Hobbes's inclinations, who discharged that trust with great fidelity and diligence. In 1634 he republished his translation of Thucydides, and prefixed to it a dedication to that young nobleman, in which he gives a long character of his father, and represents in the strongest terms the obligations he was under to that illustrious family. The same year he accompanied his noble pupil to Paris, where he applied his vacant hours to the study of natural philosophy, and more especially to the perfect understanding of mechanism, and the causes of animal motion. He had frequent conversations upon these subjects with father Marin Mersenne; a man deservedly famous, and who kept up a correspondence with almost all the learned in Europe. From Paris he attended his pupil into Italy, where at Pisa he became known to that great astronomer Galileo Galilei, who communicated to him his notions very freely; and

after having seen all that was remarkable in that country, he returned with the earl of Devonshire into England. Afterwards, foreseeing the civil wars, he went to seek a retreat at Paris; where, by the good offices of his friend father Merſenne, he became known to the famous Renatus Des Cartes, and afterwards held a correspondence with him upon several mathematical subjects, as appears from the letters of Mr. Hobbes published in the works of Des Cartes. But when this philosopher printed afterwards his *Meditations*, wherein he attempted to establish points of the highest consequence from innate ideas, Mr. Hobbes took the liberty of dissenting from him; as did also the French king's mathematical professor, the illustrious Peter Gassendi, with whom Mr. Hobbes contracted a very close friendship, which was not interrupted till the death of the former. In 1642, Mr. Hobbes printed a few copies of his famous book *De Cive*, which, in proportion as it became known, raised him many adversaries, who charged him with instilling principles which had a dangerous tendency. Among many illustrious persons who, upon shipwreck of the royal cause, retired to France for safety, was Sir Charles Cavendish, brother to the duke of Newcastle: and this gentleman, being skilled in every branch of the mathematics, proved a constant friend and patron to Mr. Hobbes; who, by embarking in 1645 in a controversy about squaring the circle, was grown so famous for it, that in 1647 he was recommended to instruct Charles prince of Wales, afterwards king Charles II. in that kind of learning. His care in the discharge of this office gained him the esteem of that prince in a very high degree: and though he afterwards withdrew his public favour to Mr. Hobbes on account of his writings, yet he always retained a sense of the services he had done him; showed him various marks of his favour after he was restored to his dominions; and, as some say, had his picture hanging in his closet. This year also was printed in Holland, by the care of M. Sorbiere, a second and more complete edition of his book *De Cive*; to which are prefixed two Latin letters to the editor, the one by Mr. Gassendi, the other by father Merſenne, in commendation of it: and in 1650 was published at London a small treatise of Mr. Hobbes's, intitled, *Human Nature*; and another, *De corpore politico*, or, "Of the elements of the law."

All this time Mr. Hobbes had been digesting, with great care and pains, his religious, political, and moral principles, into a complete system, which he called the *Leviathan*, and which was printed in English at London in 1650 and 1651. After the publication of his *Leviathan* he returned to England, and passed the summer commonly at his patron the earl of Devonshire's seat in Derbyshire, and some of his winters in town, where he had for his intimate friends some of the greatest men of the age. In 1660, upon the restoration, he quitted the country, and came up to London, where he obtained from the king assurance of protection, and had an annual pension of 100*l.* settled upon him out of the privy purse. Yet this did not render him entirely safe: for, in 1666, his *Leviathan*, and his treatise *De Cive*, were censured by parliament; which alarmed him very much, as did also the bringing in of a bill into the house of commons to punish atheism and profaneness. When this storm was a little blown over, he began to think of procuring a beautiful edition of his pieces that were in Latin; but finding this impracticable in England, he caused it to be undertaken abroad, where they were published in quarto in 1668, from the press of John Bleau. In 1669 he was visited by Cosmo de Medicis, then prince, afterwards duke of Tuscany, who gave him ample marks of his esteem and respect; and having received his picture, and a complete collection of his writings, caused them to be repositied, the former among his curiosities, the latter in his noble library at Florence. The like visits he received from foreign ambassadors and other strangers of distinction; who were curious to see a person whose singular opi-

nions and numerous writings had made so much noise all over Europe. In 1672 he wrote his own life in Latin verse, when, as he observes, he had completed his 84th year: and, in 1647, he published in English verse four books of Homer's *Odyssey*; which was so well received, that it encouraged him to undertake the whole *Iliad* and *Odyssey*, which he likewise performed and published in 1675. About this time he took his leave of London, and went to spend the remainder of his days in Derbyshire: where, however, he did not remain inactive, notwithstanding his advanced age; but published from time to time several pieces, to be found in the collection of his works. He died in 1679, aged 92.

As to his character and manners, they are thus described by Dr. White Kennet, in his *Memoirs* of the Cavendish family. "The earl of Devonshire (says he) for his whole life entertained Mr. Hobbes in his family, as his old tutor, rather than as his friend or confidant. He let him live under his roof in ease and plenty, and in his own way, without making use of him in any public, or so much as domestic affairs. He would often express an abhorrence of some of his principles in policy and religion; and both he and his lady would frequently put off the mention of his name, and say, 'He was a humorist, and nobody could account for him.' There is a tradition in the family, of the manners and customs of Mr. Hobbes, somewhat observable. His professed rule of health was to dedicate the morning to his exercise, and the afternoon to his studies. And therefore, at his first rising, he walked out, and climbed any hill within his reach; or if the weather was not dry, he fatigued himself within doors by some exercise or other, to be in a sweat: recommending that practice upon this opinion, that an old man had more moisture than heat, and therefore by such motion heat was to be acquired and moisture expelled. After this, he took a comfortable breakfast; and then went round the lodgings to wait upon the earl, the countess, and the children, and any considerable strangers, paying some short addresses to all of them. He kept these rounds till about 12 o'clock, when he had a little dinner provided for him, which he ate always by himself without ceremony. Soon after dinner he retired to his study, and had his candle with 10 or 12 pipes of tobacco laid by him; then shutting his door, he fell to smoking, thinking, and writing, for several hours. He retained a friend or two at court, and especially the lord Arlington, to protect him if occasion should require. He used to say, that it was lawful to make use of ill instruments to do ourselves good: 'If I were cast (says he) into a deep pit, and the devil should put down his cloven foot, I would take hold of it to be drawn out by it.' After the restoration he watched all opportunities to ingratiate himself with the king and his prime ministers; and looked upon his pension to be more valuable as an earnest of favour and protection, than upon any other account. His future course of life was to be free from danger. He could not endure to be left in an empty house. Whenever the earl removed, he would go along with him, even to his last stage, from Chatworth to Hardwick. When he was in a very weak condition, he dared not to be left behind, but made his way upon a feather-bed in a coach, though he survived the journey but a few days. He could not bear any discourse of death, and seemed to cast off all thoughts of it: he delighted to reckon upon longer life. The winter before he died, he made a warm coat, which he said must last him three years, and then he would have such another. In his last sickness his frequent questions were, Whether his disease was curable? and when intimations were given, that he might have ease, but no remedy, he used this expression, 'I shall be glad to find a hole to creep out of the world at;' which are reported to have been his last sensible words; and his lying some days following in a silent stupefaction, did seem owing to his mind more than to his body."

The reverend Mr. Granger observes, that Hobbes's style is incomparably better than that of any other writer in the reign of Charles I. and was for its uncommon strength and purity scarcely equalled in the succeeding reign. "He has in translation (says he) done Thucydides as much justice as he has done injury to Homer; but he looked upon himself as born for much greater things than treading in the steps of his predecessors. He was for striking out new paths in science, government, and religion; and for removing the land-marks of former ages. His ethics have a strong tendency to corrupt our mora's, and his politics to destroy that liberty which is the birthright of every human creature. He is commonly represented as a sceptic in religion, and a dogmatist in philosophy; but he was a dogmatist in both. The main principles of his *Leviathan* are as little founded in moral or evangelical truths, as the rules he has laid down for squaring the circle are in mathematical demonstration. His book on human nature is esteemed the best of his works."

HOBBIMA (Minderhout), an eminent landscape painter, was born about the year 1611 at Antwerp; but the master from whom he received his instruction is not known. He studied entirely after nature, sketching every scene that afforded him pleasure, and his choice was exceedingly picturesque. His grounds are always agreeably broken, and he was particularly fond of describing slopes diversified with shrubs, plants, or trees, which conducted the eye to some building, ruin, grove, or piece of water, and frequently to a delicate remote distance, every object perspectively contributing to delude our observation to that point. The figures which he himself designed are but indifferent, which was a defect imputable to Claude Lorraine and Gaspar Poussin as well as to Hobbima; but the latter, conscious of his inability in that respect, admitted but few figures into his designs, and those he usually placed somewhat removed from the immediate view at a prudent distance from the front line. However, most of his pictures were supplied with figures by Ostade, Teniers, and other very famous masters, which must always give them a great additional value. They are now exceedingly scarce, and industriously sought for.

HOBBY, the name of a hawk called by some authors *sub-buteo*. See **FALCO**. It is a hawk of the lure, and not of the fist; and is very like the faker, only much less. It makes excellent sport with net and spaniels; for when the birds see the hobby, they dare not commit themselves to the wing, but lie close to the ground, and so are taken in nets.

HOBBY is also a name formerly given to strong active horses of a middling size: they are reported to have been originally natives of Ireland, and were much liked and used. Nags answer the same description as to size, qualities, and employments.

HOBGOBLIN is a name vulgarly applied to fairies or apparitions. Skinner calls the word *robgooblin*, and derives it from Robin Goodfellow, Hob being the nick-name of Robin: but Wallis and Junius, with greater probability, derive it from *bopgoblins*, *empusæ*, because they are supposed to hop without moving both their feet.

HOBLERS, or **HOBILERS**, *Hobelarii*, in our ancient customs, were men who, by their tenure, were obliged to maintain a light horse or hobby, for the certifying any invasion towards the sea-side. The name was also used for certain Irish knights, who used to serve as light horsemen upon hobbies.

HOB-NAIL, a nail with a thick strong head, used in shoeing a hobby or little horse.

HOB-NOB, or **HAB-NAB**, a cant word formed from *hap ne hap*, and denoting an event which happens at random or by mere chance.

HOBBOO, a name given by the people of Otaheite, and in the neighbouring islands of the South Sea, to their superfluous

cloth. It is the thinnest and most finished preparation of the aouta.

HOBSSHEE-COFFREES, a kind of Abyssinian slaves very frequent in the empire of Hindoostan. They come mostly from a province subject to the Negus of Ethiopia, called Innariah, to the south of his other dominions, and bordering upon Negroland in Africa; from whence they are selected, and a great traffic made of them over all Mogolistan and Persia; but it is chiefly from the ports of Arabia and the Red Sea that they are brought. Nothing can be imagined more smooth or glossy, and perfectly black, than their skin; in which they far surpass the negroes on the coast of Guinea; and, generally speaking, have not any thing of their thick lips, though otherwise as woolly haired as they. They are highly valued for their courage, fidelity, and shrewdness; in which they so far excel, as often to rise to posts of great honour, and are made governors of places under the title *Sidders*.

HOBSON'S CHOICE, a vulgar proverbial expression, applied to that kind of choice in which there is no alternative. It is said to be derived from the name of a carrier at Cambridge, who let out hackney horses, and obliged each customer to take in his turn that horse which stood next the stable door.

HOCHBERG, a marquisate of Brisgaw, in Germany, in the circle of Suabia. It belongs to the prince of Baden Dourlach.

HOCHSTET, a town of Germany, in the circle of Suabia, remarkable for the great battle gained near it by the duke of Marlborough in 1704, and which the English call the battle of Blenheim, from a village of that name 3 miles S. W. of this. It is seated on the Danube, 22 miles N. E. of Ulm. E. lon. 10. 33. N. lat. 38. 48.

HO-CHUN, a town of China, of the third rank, in the province of Chan-si: thirty-two miles S. of Ping-ting.

HOCHWEISH, a town of Hungary, twenty miles W. S. W. of Kremnitz.

HOCUS-POCUS, a cant expression with which the exhibitors of legerdemain tricks generally preface their feats. The word is thought to be derived from that arch legerdemain trick of the Romish priests converting the sacramental bread into Deity; in which wonderful metamorphosis the words *boc est corpus* make a conspicuous part of the ceremony, and which words may be considered as the probable root of our modern *bocus pocus*.

HOD, a sort of tray for carrying mortar, in use among Bricklayers.

HODDESDON, a town of England, in the county of Hertford, near the river Lea, with a weekly market on Wednesday: four miles S. of Hertford, and seventeen N. of London.

HODEGOS, a term purely Greek, *ὁδηγος*, signifying *guide*. The word is chiefly used as the title of a book composed by Anastasius the Sinate, towards the close of the fifth century; being a method of disputing against the heretics, particularly the Acephali. Mr. Toland has also published a dissertation under the same title. Its subject is the pillar of fire, &c. which went before the Israelites as a guide in the desert.

HODGE-PODGE. See **HOTCH-POT**.

HODMAN, a cant term formerly used for a young scholar admitted from Westminster school to be student in Christ-church in Oxford.

HODY (Humphry), a learned English divine, was born in 1659. At 21 years of age he published his celebrated Dissertation against Aristæus's history of the 70 interpreters; which was received with great applause by all the learned, Isaac Vossius excepted, who could not bear to have his opinions opposed by such a youth. Twenty years after, he treated the subject more fully in his *De Bibliorum textibus originalibus, versionibus Græcis & Latina vulgata, libri IV.* In 1689 he wrote the

Prolegomena to John Melala's Chronicle, printed at Oxford; and the year after was made chaplain to Dr. Stillingfleet bishop of Worcester. The deprivation of the nonjuring bishops engaged him in a controversy with Mr. Dodwell; which recommended him to archbishop Tillotson, to whom, and his successor Dr. Tennison, he was domestic chaplain. In 1698 he was made regius professor of the Greek tongue at Oxford, and archdeacon of Oxford in 1704. On occasion of the controversy about the convocation, he in 1701 published a history of English councils and convocations, and of the clergy's sitting in parliament, &c. He died in 1706, leaving in MS. An account of those learned Grecians who retired to Italy on the taking of Constantinople, &c. which was published in 1742 by Dr. Jebb.

HOE, a husbandman's tool, somewhat like a cooper's adz, to cut up weeds in gardens, fields, &c. This instrument is of great use, and ought to be much more employed than it is in hacking and clearing the several corners and patches of land in spare times of the year, which would be no small advantage to it.

Horse-Hoe a large kind of hoe drawn by horses, and used to stir the intervals in the new husbandry, and clear the corn from weeds. See HUSBANDRY.

HOEING, in the new husbandry, is the breaking or dividing the soil by tillage while the corn or other plants are growing thereon. It differs from common tillage (which is always performed before the corn or plants are sown or planted) in the time of performing it; and it is much more beneficial to the crops than any other tillage. This sort of tillage is performed various ways, and by means of different instruments, as described under the article HUSBANDRY.

HOEI-TCHEOU, the most southern city of the province of Kiang-nan of China, and one of the richest of the empire. The people are economical and temperate, but they are active and enterprising in trade. They boast of their tea, varnish, and engravings, which are indeed the most esteemed in China. It has dependent upon it six cities of the third class; the mountains which surround this canton contain gold, silver, and copper mines.

HOEMATOPUS, in ornithology; a genus of birds, of the order of grallæ. See plate 3. It has a long compressed bill, with the end cuneated; the nostrils are linear, and the feet have only three toes. There is but one species, the *ostralegus*, sea-pie, or oyster-catcher. They are very common on most of our coasts; feeding on marine insects, oysters, limpets, &c. Their bills, which are compressed sideways and end obtusely, are very fit instruments to insinuate between the limpet and the rock to which these shells adhere; which they do with great dexterity to get at the fish. On the coast of France, where the tides recede so far as to leave the beds of oysters bare, these birds feed on them, forcing the shells open with their bills. They keep in summer time in pairs, laying their eggs on the bare ground: they lay four of a whitish-brown hue, thinly spotted and striped with black; and when any one approaches their young, they make a loud and shrill noise. In winter they assemble in vast flocks, and are very wild. The head, neck, scapulars, and coverts of the wings of this bird, are of a fine black; in some the neck is marked with white; the wings dusky, with a broad transverse band of white; the bill three inches long, and of a rich orange colour.

HOENZOLLERN, a principality of Germany, in the circle of Suabia, divided into branches Hoenzollern, Heckingen, and Hoenzollern Sigmaringen. Each of these princes has a revenue of about 30,000 florins; they are assised in the matricula of the empire at 290 florins, and taxed to the Imperial chamber forty-three rixdollars twenty-five kruiters.

HOESHT, a town of Germany, in the circle of the Lower Rhine and electorate of Mentz, seated in a plain, on the river Maine, three miles from Frankfort.

HOFFMAN (MAURICE), was born of a good family, at Furstenwalde, in the electorate of Brandenburg, Sept. 20, 1621; and was driven early from his native country by the plague, and also by the war that followed it. His parents, having no great notion of breeding him up to letters or science, contented themselves with having him taught writing and arithmetic: but Hoffman's taste for books and study made him very impatient under this, and he was resolved to be a scholar at all adventures. He first gained over his mother to his scheme; but she died when he was only fifteen. This, however, was luckily no impediment to his purpose; for the schoolmaster of Fustenwalde, to which after many sojournings he was now returned, was so touched with his good natural parts and violent propensity to learning, that he was at the pains of instructing him in secret. His father, convinced of his very uncommon abilities, permitted him at length to follow his inclinations, and in 1637 sent him to study in the college of Colun. Famine and the plague drove him from hence to Kopnik, where he buried his father; and in 1638 he went to Altorf, to an uncle by his mother's side, who was a professor of physic. Here he finished his studies in classical learning and philosophy, and then applied himself with the utmost ardour to physic. In 1641, when he had made some progress, he went to the university of Padua, which then abounded with men very learned in all sciences. Anatomy and botany were the great objects of his pursuit; and he became very deeply skilled in them both. When he had been at Padua about three years, he returned to Altorf, to assist his uncle, now growing infirm, in his business; and taking the degree of M. D. he applied himself very diligently to practice, in which he had great success, and acquired great fame. In 1648 he was made professor extraordinary in anatomy and chirurgery; in 1649, professor of physic, and soon after member of the college of physicians; in 1653, professor of botany, and director of the physic-garden. He acquitted himself excellently in these various employments, not neglecting in the mean time the business of his profession; in which his reputation was so high and extensive, that many princes of Germany appointed him their physician. He died of an apoplexy in 1698, aged 76, after having published a great number of works, and married three wives, by whom he had eighteen children.

HOFFMAN (John-Maurice), son of the preceding, by his first wife, was born at Altorf in 1653; and sent to a school at Herzprugk, where having acquired a competent knowledge of the Greek and Latin tongues, he returned to his father at Altorf at sixteen, and studied first philosophy, and then physic. He went afterwards to Frankfort upon the Oder, and proposed to visit the United Provinces and England; but the wars hindering, he went to Padua, where he studied two years. Then making a tour of part of Italy, he returned to Altorf in 1674, and was admitted to the degree of M. D. He spent two years in perfecting the knowledge he had acquired; and then, in 1677, was made professor extraordinary in physic, which title, in 1681, was changed to that of professor in ordinary. He now applied himself in good earnest to the practice of physic; and in process of time his fame was spread so far and wide, that he was sought after by persons of the first rank. George Frederic, marquis of Anspach, of the house of Brandenburg, chose him in 1695 for his physician; and about the latter end of the year, Hoffman attended this prince into Italy, and renewed his acquaintance with the learned there. Upon the death of his father in 1698, he was chosen to succeed him in his places of botanic professor and director of the physic-garden. He was elected also the same year rector of the university of Altorf: a post, which he had occupied in 1685. He lost his great friend and patron, the marquis of Anspach, in 1703; but found the same kindness from his successor William Frederic, who pressed

him so earnestly to reside nearer, and made him likewise such advantageous offers, that Hoffman, in 1713, removed from Altorf to Anspach, where he died in 1727. He had married a wife in 1681, by whom he had five children. He published a great number of works, which are highly esteemed by those of his own profession.

HOFFMAN (Frederic), an eminent physician, was born at Hall near Magdeburg in 1660; took a doctor of physic's degree in 1681; was made professor of physic at Hall in 1693; and filled the chair till his death, which happened in 1742. His works were collected at Geneva in six large folios, 1748 and 1754. The most remarkable incidents of his life are,—his journey into Holland and England, where he became intimately acquainted with Paul Herman and Robert Boyle;—his never taking any fees, as he was supported by an annual stipend;—his curing those great personages of inveterate diseases, the empress, the emperor Charles VI. and Frederic I. king of Prussia;—his teaching that acid and mineral waters might be drunk with milk with safety and advantage, which physicians before had generally reckoned pernicious;—his discovering the virtues of Seltzer and Lauchstad waters in preventing and curing stubborn diseases;—his preparing and recommending an acid cathartic salt from the waters of Sedlic, which was commonly used in Germany. He survived his eightieth year.

HOFFMANNISTS, in ecclesiastical history, denote those who espoused the sentiments of Daniel Hoffmann, professor of the university of Helmstadt, who, from the year 1598, maintained, that philosophy was a mortal enemy to religion; and that what was true in philosophy was false in theology. These absurd and pernicious tenets occasioned a warm and extensive controversy. At length Hoffmann was compelled by Julius duke of Brunswick to retract his invectives against philosophy, and to acknowledge, in the most open manner, the harmony and union of sound philosophy with true and genuine theology.

HOG, in zoology. See SUS.

Hog's *Dung*, is by Mortimer reckoned one of the richest manures we are acquainted with, and the next in value to sheep's dung; and is found to be equal in virtue to twice the quantity of any other dung except that. The ancients seem to have been displeased with it on account of its fostering weeds; but this is only accusing it of being too rich, for any dung will do that when laid too thick. It is an excellent manure for pasture-grounds, and excels all other kinds of dung for trees. The farmers who use this dung for their lands, generally take care to save it, by well paving the styes; and increase the quantity by throwing in bean-stalks, stubble, and many other things of a like nature: and, by good management of this kind, many farmers have procured 50 or 60 loads of excellent manure a year out of a small stye. The very best way of using this dung is by mixing it with horse dung; and for this reason it is best to have the stye near the stable, that the two cleanings may be mixed in one heap, and used together.

They have, in many parts of Staffordshire, a poor, light, shallow land, on which they sow a kind of white pea: the land is neither able to bear this nor any thing else to advantage for their reaping; but, when the peas are ripe, they turn in as many hogs as the quantity of pease will fatten, suffering them to live at large, and to remain there day and night: in consequence of this, the land will produce good crops of hay for several years afterwards; or, if too poor for that, it will at worst raise grass enough to make it good pasture-ground.

Hog's *Lard*. See AXUNGIA.

Hog, on board of a ship, is a sort of flat scrubbing broom, formed by inclosing a number of short twigs of birch or such wood between two pieces of plank fastened together, and cutting off the ends of the twigs. It is used to scrape the filth from a ship's bottom under water, particularly in the act of boot-

topping. For this purpose they fit to this broom a long staff with two ropes; one of which is used to thrust the hog under the ship's bottom, and the other to guide and pull it up again close to the planks. This business is commonly performed in the ship's boat, which is confined as close as possible to the vessel's side during the operation, and shifted from one part of the side to another till the whole is completed.

HOGARTH (William), a truly great and original genius, is said by Dr. Burn to have been the descendant of a family originally from Kirkby Thore, in Westmoreland. His father, who had been a schoolmaster in the same county, went early to London, where he was employed as a corrector of the press; and appears to have been a man of some learning, a dictionary in Latin and English, which he composed for the use of schools, being still existing in MS. He married in London; and kept a school in Ship-Court, in the Old-Bailey. Our hero was born in 1697 or 1698, in the parish of St. Martin Ludgate. The outset of his life, however, was unpromising. "He was bound," says Mr. Walpole, "to a mean engraver of arms on plate." Hogarth probably chose this occupation, as it required some skill in drawing; to which his genius was particularly turned, and which he contrived assiduously to cultivate. His master, it since appears, was Mr. Ellis Gamble, a silversmith of eminence, who resided in Cranbourn-street, Leicester-fields. In this profession it is not unusual to bind apprentices to the single branch of engraving arms and ciphers on every species of metal; and in that particular department of the business young Hogarth was placed; "but, before his time was expired, he felt "the impulse of genius, and that it directed him to painting." During his apprenticeship, he set out one Sunday, with two or three companions, on an excursion to Highgate. The weather being hot, they went into a public-house, where they had not been long before a quarrel arose between some persons in the same room. One of the disputants struck the other on the head with a quart pot, and cut him very much. The blood running down the man's face, together with the agony of the wound, which had distorted his features into a most hideous grin, presented Hogarth, who showed himself thus early "apprehensive of the mode Nature had intended he should pursue," with too laughable a subject to be overlooked. He drew out his pencil, and produced on the spot one of the most ludicrous figures that ever was seen. What rendered this piece the more valuable was, that it exhibited an exact likeness of the man, with the portrait of his antagonist, and the figures in caricature of the principal persons gathered round him.

How long he continued in obscurity we cannot exactly learn; but the first piece in which he distinguished himself as a painter is supposed to have been a representation of Wanstead Assembly. The figures in it, we are told, were drawn from the life, and without any circumstances of burlesque. The faces were said to be extremely like, and the colouring rather better than in some of his late and more highly finished performances. From the date of the earliest plate that can be ascertained to be the work of Hogarth, it may be presumed that he began business on his own account at least as early as 1720.

His first employment seems to have been the engraving of arms and shop bills. The next was to design and furnish plates for booksellers. Mr. Bowles, at the Black Horse in Cornhill, was one of his earliest patrons, whose prices were very low. His next friend in that line was Mr. Philip Overton, who paid him somewhat better for his labour and ingenuity.

There are many family pictures by Hogarth, in the style of serious conversation pieces, still existing. What the prices of his portraits were, Mr. Nichols strove in vain to discover; but he suspects they were originally very low, as the people who are best acquainted with them choose to be silent on that subject.

It happened, in the early part of Hogarth's life, that a nobleman who was uncommonly ugly and deformed came to sit to him for his picture. It was executed with a skill that did honour to the artist's abilities; but the likeness was rigidly observed, without even the necessary attention to compliment or flattery. The peer, disgusted at this counterpart of his dear self, never once thought of paying for a reflector that would only insult him with his deformities. Some time was suffered to elapse before the artist applied for his money; but afterwards many applications were made by him (who had then no need of a banker) for payment, without success. The painter, however, at last hit upon an expedient, which he knew must alarm the nobleman's pride, and by that means answer his purpose. It was couched in the following card: "Mr. Hogarth's dutiful respects to lord —: finding that he does not mean to have the picture which was drawn for him, is informed again of Mr. H.'s necessity for the money: if, therefore, his lordship does not send for it in three days, it will be disposed of, with the addition of a tail, and some other little appendages, to Mr. Hare, the famous wild-beast man; Mr. H. having given that gentleman a conditional promise of it for an exhibition picture on his lordship's refusal." This intimation had the desired effect. The picture was sent home, and committed to the flames.

Mr. Walpole has remarked, that if our artist "indulged his spirit of ridicule in personalities, it never proceeded beyond sketches and drawings;" and wonders "that he never, without intention, delivered the very features of any identical person." Mr. Nichols assures us, from unquestionable authority, that almost all the personages who attend the levee of the Rake were undoubted portraits; and that in "Southwark Fair," and the "Modern Midnight Conversation," as many more were discoverable. While Hogarth was painting the "Rake's Progress," he had a summer residence at Isleworth; and never failed to question the company who came to see these pictures, if they knew for whom one or another figure was designed. When they guessed wrong, he set them right.

The Duke of Leeds has an original scene in the "Beggar's Opera," painted by Hogarth. It is that in which Lucy and Polly are on their knees, before their respective fathers, to intercede for the life of the hero of the piece. All the figures are either known or supposed to be portraits. If we are not misinformed, the late Sir Thomas Robinson (perhaps better known by the name of Long Sir Thomas) is standing in one of the side-boxes. Macheath, unlike his spruce representative on our present stage, is a slouching bully; and Polly appears happily disencumbered of such a hoop as the daughter of Peachum within our younger memories has worn. Mr. Walpole has a picture of a scene in the same piece, where Macheath is going to execution. In this also the likenesses of Walker and Miss Fenton, afterwards duchess of Bolton (the first and original Macheath and Polly) are preserved. In the year 1726, when the affair of Mary Tofts, the rabbit breeder of Godalming, engaged the public attention, a few of our principal surgeons subscribed their guinea a piece to Hogarth, for an engraving from a ludicrous sketch he had made on that very popular subject. This plate, amongst other portraits, contains that of M. St. André, then anatomist to the royal household, and in high credit as a surgeon. In 1727, Hogarth agreed with Morris, an upholsterer, to furnish him with a design on canvas, representing the element of earth, as a pattern for tapestry. The work not being performed to the satisfaction of Morris, he refused to pay for it; and our artist, by a suit at law, recovered the money.

In 1730 Mr. Hogarth married the only daughter of Sir James Thornhill, by whom he had no child. This union, indeed, was a stolen one, and consequently without the approbation of Sir James, who, considering the youth of his daughter, then barely 18, and the slender finances of her husband, as yet

an obscure artist, was not easily reconciled to the match. Soon after this period, however, he began his "Harlot's Progress" (the coffin in the last plate is inscribed Sept. 2. 1731); and was advised by lady Thornhill to have some of the scenes in it placed in the way of his father-in-law. Accordingly, one morning early, Mrs. Hogarth undertook to convey several of them into his dining-room. When he arose, he inquired from whence they came; and being told by whom they were introduced, he cried out, "Very well; the man who can furnish representations like these can also maintain a wife without a portion." He designed this remark as an excuse for keeping his purse-strings close; but, soon after, became both reconciled and generous to the young people. An allegorical ceiling by Sir James Thornhill is at the house of the late Mr. Huggins, at Headly Park, Hants. The subject of it is the story of Zephyrus and Flora; and the figure of a satyr and some others were painted by Hogarth.

In 1732 Hogarth ventured to attack Mr. Pope, in a plate called "The Man of Taste;" containing a view of the Gate of Burlington-house, with Pope whitewashing it and bespattering the duke of Chandos's coach. This plate was intended as a satire on the translator of Homer, Mr. Kent the architect, and the earl of Burlington. It was fortunate for Hogarth that he escaped the lash of the former. Either Hogarth's obscurity at that time was his protection, or the bard was too prudent to exasperate a painter who had already given such proof of his abilities for satire.

Soon after his marriage, Hogarth had summer lodgings at South-Lambeth; and being intimate with Mr. Tyers, contributed to the improvement of the Spring Gardens at Vauxhall, by the hint of embellishing them with paintings, some of which were the suggestions of his own truly comic pencil. For his assistance, Mr. Tyers gratefully presented him with a gold ticket of admission for himself and his friends.

In 1733 his genius became conspicuously known. The third scene of his "Harlot's Progress" introduced him to the notice of the great. At a board of treasury which was held a day or two after the appearance of that print, a copy of it was shown by one of the lords, as containing, among other excellencies, a striking likeness of Sir John Gonson. It gave universal satisfaction: from the treasury each lord repaired to the print-shop for a copy of it, and Hogarth rose completely into fame.

The ingenious Abbé Du Bos has often complained that no history painter of his time went through a series of actions, and thus, like an historian, painted the successive fortune of an hero from the cradle to the grave. What Du Bos wished to see done, Hogarth performed. He launches out his young adventurer a simple girl upon the town, and conducts her through all the vicissitudes of wretchedness to a premature death. This was painting to the understanding and to the heart; none had ever before made the pencil subservient to the purposes of morality and instruction: a book like this is fitted to every soil and every observer; and he that runs may read. Nor was the success of Hogarth confined to his persons. One of his excellencies consisted in what may be termed the furniture of his pieces; for as, in sublime and historical representations, the fewer trivial circumstances are permitted to divide the spectator's attention from the principal figures, the greater is their force; so, in scenes copied from familiar life, a proper variety of little domestic images contributes to throw a degree of verisimilitude on the whole. "The Rake's levee-room," says Mr. Walpole, "the nobleman's dining-room, the apartments of the husband and wife in Marriage à la Mode, the alderman's parlour, the bed-chamber, and many others, are the history of the manners of the age."

In 1745 Hogarth sold about 20 of his capital pictures by auction; and in the same year acquired additional reputation

by the six prints of "Marriage à la Mode," which may be regarded as the ground-work of a novel called "The Marriage Act," by Dr. Shebbeare, and of "The Clandestine Marriage."

Soon after the peace of Aix la Chapelle, he went over to France, and was taken into custody at Calais while he was drawing the gate of that town; a circumstance which he has recorded in his picture, intitled, "O the Roast Beef of Old England!" published March 26, 1749. He was actually carried before the governor as a spy, and after a very strict examination committed a prisoner to Granville, his landlord, on his promising that Hogarth should not go out of his house till he was to embark for England.

In 1753 he appeared to the world in the character of an author, and published a quarto volume, intitled, "The Analysis of Beauty, written with a view of fixing the fluctuating ideas of taste." In this performance he shows, by a variety of examples, that a curve is the line of beauty, and that round swelling figures are most pleasing to the eye; and the truth of his opinion has been countenanced by subsequent writers on the same subject. In this work, the leading idea of which was hieroglyphically thrown out in a frontispiece to his works in 1745, he acknowledges himself indebted to his friends for assistance, and particularly to one gentleman for his corrections and amendments of at least a third part of the *wording*. This friend was Dr. Benjamin Hoadley the physician, who carried on the work to about the third part, Chap. IX. and then, through indisposition, declined the friendly office with regret. Mr. Hogarth applied to his neighbour Mr. Ralph; but it was impossible for two such persons to agree, both alike vain and positive. He proceeded no farther than about a sheet, and they then parted friends, and seem to have continued such. The kind office of finishing the work, and superintending the publication, was lastly taken up by Dr. Morell, who went through the remainder of the book. The preface was in like manner corrected by the Rev. Mr. Townley. The family of Hogarth rejoiced when the last sheet of the "Analysis" was printed off; as the frequent disputes he had with his coadjutors, in the progress of the work, did not much harmonize his disposition. This work was translated into German by Mr. Mylins, when in England, under the author's inspection; and the translation was printed in London, price five dollars. A new and correct edition was in 1754 proposed for publication at Berlin, by Ch. Fr. Vok, with an explanation of Mr. Hogarth's satirical prints, translated from the French; and an Italian translation was published at Leghorn in 1761.

Hogarth had one failing in common with most people who attain wealth and eminence without the aid of liberal education.—He affected to despise every kind of knowledge which he did not possess. Having established his fame with little or no obligation to literature, he either conceived it to be needless, or decried it because it lay out of his reach. His sentiments, in short, resembled those of Jack Cade, who pronounced sentence on the clerk of Chatham because he could write and read. Till, in evil hour, this celebrated artist commenced author, and was obliged to employ the friends already mentioned to correct his "Analysis of Beauty," he did not seem to have discovered that even spelling was a necessary qualification; and yet he had ventured to ridicule the late Mr. Rich's deficiency as to this particular, in a note which lies before the Rake whose play is refused while he remains in confinement for debt. Previous to the time of which we are now speaking, one of our artist's common topics of declamation was the uselessness of books to a man of his profession. In "Beer-street," among other volumes consigned by him to the pastry cook, we find Turnbull "on Ancient Painting;" a treatise which Hogarth should have been able to understand before he ventured to condemn. Garrick himself, however, was not more ductile to flattery. A

word in praise of "Sigismunda," his favourite work, might have commanded a proof print, or forced an original sketch out of our artist's hands. The following authenticated story of our artist will also serve to show how much more easy it is to detect ill placed or hyperbolical adulation respecting others than when applied to ourselves. Hogarth being at dinner with the great Chefelden and some other company, was told that Mr. John Freke, surgeon of St. Bartholomew's hospital, a few evenings before, at Dick's Coffee-house, had asserted that Greene was as eminent in composition as Handel. "That fellow Freke," replied Hogarth, "is always shooting his bolt absurdly one way or another! Handel is a giant in music; Greene only a light Florimel kind of a composer."—"Aye," says our artist's informant; "but at the same time Mr. Freke declared you were as good a portrait-painter as Vandyck."—"There he was in the right," adds Hogarth; "and so by G—I am, give me my time, and let me choose my subject!"

A specimen of Hogarth's propensity to merriment, on the most trivial occasions, is observable in one of his cards requesting the company of Dr. Arnold King to dine with him at the Mitre. Within a circle, to which a knife and fork are the supporters, the written part is contained. In the centre is drawn a pye, with a mitre on the top of it: and the invitation of our artist concludes with the following words in Greek letters—to *Eta Beta Pi*. The rest of the inscription is not very accurately spelled. A quibble by Hogarth is surely as respectable as a conundrum by Swift.

In one of the early exhibitions at Spring-Gardens, a very pleasing small picture by Hogarth made its first appearance. It was painted for the Earl of Charlemont, in whose collection it remains, and was intitled "Picquet, or Virtue in Danger;" and shows us a young lady who during a *tête-à-tête* had just lost all her money to a handsome officer of her own age. He is represented in the act of returning her a handful of bank-bills, with the hope of exchanging them for a softer acquisition and more delicate plunder. On the chimney-piece a watch-case and a figure of Time over it, with this motto—NUNC. Hogarth has caught his heroine during this moment of hesitation, this struggle with herself, and has marked her feelings with uncommon success.

In the "Miser's Feast," Mr. Hogarth thought proper to pillory Sir Isaac Shard, a gentleman proverbially avaricious. Hearing this, the son of Sir Isaac, the late Isaac Pacatus Shard, Esq. a young man of spirit, just returned from his travels, called at the painter's to see the picture; and, among the rest, asking the Cicerone "whether that odd figure was intended for any particular person?" On his replying "that it was thought to be very like one Sir Isaac Shard," he immediately drew his sword and flashed the canvas. Hogarth appeared instantly in great wrath: to whom Mr. Shard calmly justified what he had done, saying "that this was a very unwarrantable licence; that he was the injured party's son, and that he was ready to defend any suit at law;" which, however, was never instituted.

About 1757, his brother-in-law, Mr. Thornhill, resigned the place of king's serjeant-painter in favour of Mr. Hogarth.

The last remarkable circumstance of his life was his contest with Mr. Churchill. It is said that both met at Westminster-hall; Hogarth to take by his eye a ridiculous likeness of the poet, and Churchill to furnish a description of the painter. But Hogarth's print of the poet was not much esteemed, and the poet's letter to him was but little admired. Some pretend, indeed, to say, that it broke the painter's heart; but this we can from good authority say is not true. Indeed the report falls of itself; for we may as well say, that Hogarth's pencil was as efficacious as the poet's pen, since neither long survived the contest.

It may be truly observed of Hogarth, that all his powers of delighting were restrained to his pencil. Having rarely been admitted into polite circles, none of his sharp corners had been rubbed off, so that he continued to the last a gross uncultivated man. The slightest contradiction transported him into rage. To some confidence in himself he was certainly entitled: for, as a comic painter, he could have claimed no honour that would not most readily have been allowed him; but he was at once unprincipled and variable in his political conduct and attachments. He is also said to have beheld the rising eminence and popularity of Sir Joshua Reynolds with a degree of envy; and, if we are not misinformed, frequently spoke with asperity both of him and his performances. Justice, however, obliges us to add, that our artist was liberal, hospitable, and the most punctual of paymasters; so that, in spite of the emoluments his works had procured to him, he left but an inconsiderable fortune to his widow. His plates indeed are such resources to her as may not speedily be exhausted. Some of his domestics had lived many years in his service; a circumstance that always reflects credit on a master. Of most of these he painted strong likenesses on a canvas, still in Mrs. Hogarth's possession.

Of Hogarth's lesser plates many were destroyed. When he wanted a piece of copper on a sudden, he would take any from which he had already worked off such a number of impressions as he supposed he should sell. He then sent it to be effaced, beat out, or otherwise altered to his present purpose. The plates which remained in his possession were secured to Mrs. Hogarth by his will dated, Aug. 12. 1764, chargeable with an annuity of 80*l.* to his sister Anne, who survived him. When, on the death of his other sister, she left off the business in which she was engaged, he kindly took her home, and generously supported her, making her at the same time useful in the disposal of his prints. Want of tenderness and liberality to his relations was not among the failings of Hogarth.

The following character of Hogarth, as an artist, is given by Mr. Gilpin in his *Essay on Prints*. "The works of this master abound in true humour; and satire, which is generally well directed: they are admirable moral lessons, and a fund of entertainment suited to every taste; a circumstance which shews them to be just copies of nature. We may consider them too as valuable repositories of the manners, customs, and dresses of the present age. What a fund of entertainment would a collection of this kind afford, drawn from every period of the history of Britain?—How far the works of Hogarth will bear a critical examination, may be the subject of a little more enquiry.

"In design, Hogarth was seldom at a loss. His invention was fertile, and his judgment accurate. An improper incident is rarely introduced, a proper one rarely omitted. No one could tell a story better, or make it in all its circumstances more intelligible. His genius, however, it must be owned, was suited only to low or familiar subjects; it never soared above common life: to subjects naturally sublime, or which from antiquity or other circumstances borrowed dignity, he could not rise. In composition we see little in him to admire. In many of his prints the deficiency is so great as plainly to imply a want of all principle; which makes us ready to believe, that when we do meet with a beautiful group, it is the effect of chance. In one of his minor works, the Idle Prentice, we seldom see a crowd more beautifully managed than in the last print. If the sheriff's officers had not been placed in a line, and had been brought a little lower in the picture, so as to have formed a pyramid with the cart, the composition had been unexceptionable; and yet the first print of this work is such a striking instance of disagreeable composition, that it is amazing how an artist who had any idea of beautiful forms could suffer so unmasterly a performance to leave his hands. Of the distribution of light

Hogarth had as little knowledge as of composition. In some of his pieces we see a good effect, as in the *Execution* just mentioned; in which, if the figures at the right and left corners had been kept down a little, the light would have been beautifully distributed on the fore-ground, and a fine secondary light spread over part of the crowd. But at the same time there is so obvious a deficiency in point of effect in most of his prints, that it is very evident he had no principles. Neither was Hogarth a master in drawing. Of the muscles and anatomy of the head and hands he had perfect knowledge; but his trunks are often badly moulded, and his limbs ill set on: yet his figures, upon the whole, are inspired with so much life and meaning, that the eye is kept in good-humour in spite of its inclination to find fault. The author of the *Analysis of Beauty*, it might be supposed, would have given us more instances of grace than we find in the works of Hogarth; which shews strongly that theory and practice are not always united. Many opportunities his subjects naturally afford of introducing graceful attitudes, and yet we have very few examples of them. With instances of picturesque grace his works abound. Of his expression, in which the force of his genius lay, we cannot speak in terms too high. In every mode of it he was truly excellent. The passions he thoroughly understood, and all the effects which they produce in every part of the human frame. He had the happy art also of conveying his ideas with the same precision with which he conceived them. He was excellent too in expressing any humorous oddity which we often see stamped upon the human face. All his heads are cast in the very mould of nature. Hence that endless variety which is displayed through his works; and hence it is that the difference arises between his heads and the affected caricatures of those masters who have sometimes amused themselves with patching together an assemblage of features from their own ideas. Such are Spaniolet's; which, though admirably executed, appear plainly to have no archetypes in nature. Hogarth's, on the other hand, are collections of natural curiosities. The *Oxford-heads*, the *Physician's arms*, and some of his other pieces, are expressly of this humorous kind. They are truly comic, though ill-natured effusions of mirth: more entertaining than Spaniolet's, as they are pure nature; but less innocent, as they contain ill-directed ridicule.—But the species of expression in which this master perhaps most excels, is that happy art of catching those peculiarities of art and gesture which the ridiculous part of every profession contract, and which for that reason become characteristic of the whole. His counsellors, his undertakers, his lawyers, his usurers, are all conspicuous at sight. In a word, almost every profession may see in his works that particular species of affectation which they should most endeavour to avoid.

The execution of this master is well suited to his subjects and manner of treating them. He etched with great spirit, and never gave one unnecessary stroke."

HOGSHEAD, in commerce, a measure of capacity containing 63 gallons.

HOGUE, a town and cape on the north-west point of Normandy in France; near which admiral Rook burnt the French admiral's ship, called the *Rising Sun*, with 12 more large men of war, the day after the victory obtained by admiral Russel near Cherbourg in May 1692. W. long. 2. 0. N. lat. 49. 53.

HOIST, in sea-language, denotes the perpendicular height of a flag or ensign, as opposed to the fly, which signifies its breadth from the staff to the outer edge.

HOISTING signifies the operation of drawing up any body by the assistance of one or more tackles. Hoisting is never applied to the act of pulling up any body by the help of a single block, except in the exercise of extending the sails by drawing them upwards along the masts or stays, to which it is invariably applied.

HOKE-DAY, *Hock-Day*, or *Hock-Tuesday*, in our ancient customs (*dies Martis, quem quindenam paschæ vocant*), the second Tuesday after Easter week; a solemn festival celebrated for many ages in England in memory of the great slaughter of the Danes in the time of king Ethelred, they having been in that reign almost all destroyed in one day in different parts of the kingdom, and that principally by women. This is still kept up in some counties; and the women bear the principal sway in it, stopping all passengers with ropes and chains, and exacting some small matter from them to make merry with. This day was very remarkable in former times, inasmuch as to be used on the same footing with Michaelmas for a general term or time of account. We find leases without date reserving so much rent payable *ad duos anni terminos, scil. ad le hoke-day, & ad festum sancti Michaelis*. In the accounts of Magdalen-college, Oxford, there is yearly an allowance *pro mulieribus hockantiibus* of some manors of theirs in Hampshire; where the men hock the women on Mondays, and the women hock them on Tuesdays. The meaning of it is, that on that day the women in merriment stopped the way with ropes, and pulled passengers to them, desiring something to be laid out for pious uses.

HOKE-Day Money, or *Hock-Tuesday Money*, a tribute anciently paid the landlord, for giving his tenants and bondmen leave to celebrate hock-day, or hoke-day, in memory of the expulsion of the domineering Danes.

HO-KIEN-FOU, a city of China, and one of the principal in the province of Pe-tcheli. It has two cities of the second, and fifteen of the third, class in its district, but is remarkable for nothing but the neatness of its streets.

HOLBECHE, a town in Lincolnshire, with a market on Thursday; 12 miles S. of Boston, and 108 N. of London.

HOLBEIN (Hans), a celebrated painter, born at Basil in Switzerland in 1498, learned the rudiments of his art from his father, who was a painter; but soon showed his superior genius. In the town house of Basil he painted our Saviour's Passion; and in the fish market of the same city Death's Dance, and a Dance of Peasants, which were extremely admired; and Erasmus was so pleased with them, that he desired him to draw his picture, and was ever after his friend. He staid some years longer at Basil, till his necessities, occasioned by his own extravagance and an increasing family, made him comply with Erasmus's persuasions to go to England. In his journey he staid some days at Strasburg, where it is said he applied to a very great painter for work, who took him in, and ordered him to give a specimen of his skill. Upon this, Holbein finished a piece with great care, and painted a fly on the most eminent part of it; after which he privately withdrew in the absence of his master, and pursued his journey, without saying any thing to any body. When the painter returned home, he was astonished at the beauty and elegance of the drawing; and especially at the fly, which he at first took for a real one, and endeavoured to remove it with his hand. He now sent all over the city for his journeyman; but after many enquiries, discovered that he had been thus deceived by the famous Holbein.—Holbein having in a manner begged his way to England, presented a letter of recommendation from Erasmus to Sir Thomas More, and also showed him Erasmus's picture. Sir Thomas, who was then lord chancellor, received him with all the joy imaginable, and kept him in his house between two and three years; in which time he drew Sir Thomas's picture, and those of many of his relations and friends. Holbein one day happening to mention a nobleman who had some years before invited him to England, Sir Thomas was very solicitous to know who it was. Holbein said that he had forgot his title, but remembered his face so well, that he believed he could draw his likeness; which he did so perfectly, that the nobleman it is said was immediately known

by it. The chancellor having now adorned his apartments with the productions of this great painter, resolved to introduce him to Henry VIII. For this purpose, he invited that prince to an entertainment; having, before he came, hung up all Holbein's pieces in the great hall, in the best order, and placed in the best light. The king, on his first entrance into this room, was so charmed with the sight, that he asked whether such an artist was now alive, and to be had for money? Upon this, Sir Thomas presented Holbein to his majesty; who immediately took him into his service, and brought him into great esteem with the nobility and gentry, by which means he drew a vast number of portraits. But while he was here, there happened an affair which might have proved fatal to him, had he not been protected by the king. On the report of this painter's character, a lord of the first quality came to see him when he was drawing a figure after the life. Holbein sent to desire his lordship to defer the honour of his visit to another day; which the nobleman taking for an affront, broke open the door, and very rudely went up stairs. Holbein hearing a noise, came out of his chamber; and meeting the lord at his door, fell into a violent passion, and pushed him backwards from the top of the stairs to the bottom. However, immediately reflecting on what he had done, he escaped from the tumult he had raised, and made the best of his way to the king. The nobleman, much hurt, though not so much as he pretended, was there soon after him; and upon opening his grievance, the king ordered Holbein to ask his pardon. But this only irritated the nobleman the more, who would not be satisfied with less than his life; upon which the king sternly replied, "My lord, you have not now to do with Holbein, but with me: whatever punishment you may contrive by way of revenge against him, shall certainly be inflicted on yourself. Remember, pray, my lord, that I can whenever I please make seven lords of seven ploughmen, but I cannot make one Holbein of even seven lords." Holbein died of the plague at his lodgings at Whitehall, in 1554. "It is amazing (says De Piles), that a man born in Switzerland, and who had never been in Italy, should have so good a *gusto*, and so fine a genius for painting." He painted alike in every manner; in fresco, in water-colours, in oil, and in miniature. His genius was sufficiently shewn in the historical style, by two celebrated compositions which he painted in the hall of the Stillyard company. He was also eminent for a rich vein of invention, which he shewed in a multitude of designs which he drew for engravers, statuarys, jewellers, &c. and he had this singularity, that he painted with his left hand.

HOLCUS, **INDIAN MILLET** or **CORN**; a genus of the monœcia order, belonging to the polygamia class of plants; and in the natural method ranking under the 4th order, *Gramina*. The calyx of the hermaphrodite is an uniflorous or biflorous glume; the corolla is a glume with an awn; there are three stamina, two styles, and one seed. The male calyx is a bivalved glume; there is no corolla, but three stamina.

Of this genus there are 13 species, two of which are natives of Britain. The most remarkable of these is the *lanatus*, or creeping soft-grass of Hudson; for the description and properties of which see **HUSBANDRY**. The most remarkable of the foreign species is the *sorghum*, or Guinea-corn. The stalks are large, compact, and full eight feet high. In Senegal the fields are entirely covered with it. See pl. 10. The negroes, who call it *guiarnot*, cover the ears when ripe with its own leaves to shelter it from the sparrows, which are very mischievous in that country. The grain made into bread, or otherwise used, is esteemed very wholesome. With this the slaves in the West Indies are generally fed, each being allowed from a pint to a quart every day. The juice of the stalks is so agreeably luscious, that, if prepared as the sugar-canes, they would afford an excellent sugar. The negroes on the coast of Guinea make of

two kinds of millet a thick-grained pap called *couscous*, which is their common food.

HOLD, the whole interior cavity or belly of a ship, or all that part of her inside which is comprehended between the floor and the lower-deck throughout her whole length. This capacious apartment usually contains the ballast, provisions, and stores of a ship of war, and the principal part of the cargo in a merchantman. The disposition of these articles with regard to each other, naturally falls under consideration in the article **STOWAGE**; it suffices in this place to say, that the places where the ballast, water, provisions, and liquors are stowed, are known by the general name of the *hold*. The several store-rooms are separated from each other by *bulk-heads*, and are denominated according to the articles which they contain, the *sail-room*, the *bread-room*, the *fish-room*, the *spirit-room*, &c.

HOLDER (William), a learned and philosophical Englishman, was born in Nottinghamshire, educated in Pembroke-hall, Cambridge, and in 1642 became rector of Blechingdon, Oxford. In 1660 he proceeded D. D. was afterwards canon of Ely, fellow of the Royal Society, canon of St. Paul's, sub-dean of the royal chapel, and sub-almoner to his majesty. He was a very accomplished person, and withal a great virtuoso: and he wonderfully distinguished himself, by making a young gentleman of distinction, who was born deaf and dumb, to speak. This gentleman's name was Alexander Popham, son of colonel Edward Popham, who was some time an admiral in the service of the long parliament. The cure was performed by him in his house at Blechingdon in 1659; but Popham losing what he had been taught by Holder after he was called home to his friends, was sent to Dr. Wallis, who brought him to his speech again. Holder published a book, intitled "The Elements of Speech; an essay of inquiry into the natural Production of Letters: with an appendix concerning persons that are deaf and dumb, 1669," 8vo. In the appendix he relates how soon, and by what methods, he brought Popham to speak. In 1678 he published in 4to "a Supplement to the Philosophical Transactions of July 1670, with some reflections on Dr. Wallis's letter there inserted." This was written to claim the glory of having taught Popham to speak, which Wallis in the said letter had claimed to himself; upon which the Doctor soon after published "a Defence of the Royal Society, and the Philosophical Transactions, particularly those of July 1670, in answer to the Cavils of Dr. William Holder, 1678," 4to. Holder was skilled in the theory and practice of music, and wrote "a Treatise of the natural Grounds and Principles of Harmony, 1694," 8vo. He wrote also "a Discourse concerning Time, with Application of the natural Day, lunar Month, and solar Year, &c. 1694," 8vo. He died at Amen Corner in London, January 24, 1696-7, and was buried in St. Paul's.

HOLDERNESS, a peninsula in the east-riding of Yorkshire, having the German sea on the east, and the Humber on the south. It had the title of an earldom, now extinct.

HOLDSWORTH (Edward), a very polite and elegant scholar, was born about 1688, and trained at Winchester school. He was thence elected demy of Magdalen college, Oxford, in July 1705; took the degree of M. A. in April 1711; became a college-tutor, and had many pupils. In 1715, when he was to be chosen into a fellowship, he resigned his demyship and left the college, because unwilling to swear allegiance to the new government. The remainder of his life was spent in travelling with young noblemen and gentlemen as tutor: in 1741 and 1744 he was at Rome in this capacity. He died of a fever at Lord Digby's house at Colehill in Warwickshire, December 30, 1747. He was the author of the "Muscipula," a poem, esteemed a master piece of its kind, and of which there is a good English translation by Dr. John Hoadley, in vol. 5. of *Dodley's Miscellanies*. He was the author also of a disserta-

tion, intitled "Pharfalia and Philippi; or the two Philippi in Virgil's Georgics attempted to be explained and reconciled to History, 1741," 4to: and of "Remarks and Dissertations on Virgil; with some other classical observations, published with several notes and additional remarks by Mr. Spence, 1768," 4to. Mr. Spence speaks of him in *Polymetis*, as one who understood Virgil in a more masterly manner than any person he ever knew.

HOLDSWORTHY, a large town in Devonshire, with a market on Saturday. It is seated between two branches of the Tamar, 43 miles E. N. E. of Exeter, and 215 miles W. by S. of London. W. lon. 2. 42. N. lat. 50. 50.

HOLERACEÆ, (from *bolus*, "pot-herbs"); the name of the 12th order in Linnæus's fragments of a natural method, consisting of plants which are used for the table, and enter into the economy of domestic affairs. See **BOTANY**, p. 50.

HOLIBUT, in ichthyology. See **PLEURONECTES**.

HOLIDAY (Dr. Barten), a learned divine and poet, was the son of a taylor in Oxford, and born there about the year 1593. He studied at Christ-church college, and in 1615 took orders. He was before admired for his skill in poetry and oratory; and now distinguishing himself by his eloquence and popularity as a preacher, he had two benefices conferred on him in the diocese of Oxford. In 1618 he went as chaplain to Sir Francis Stewart, when he accompanied Count Gondamore to Spain. Afterwards he became chaplain to the king, and before the year 1626 was promoted to the archdeaconry of Oxford. In 1642 he took the degree of doctor of divinity at Oxford; near which place he sheltered himself during the time of the rebellion; but after the restoration returned to his archdeaconry, where he died in 1661. His works are, 1. Twenty sermons, published at different times. 2. *Philosophiæ politico barbaræ specimen*, quarto. 3. Survey of the world, a poem in ten books, octavo. 4. A translation of the fables of Juvenal and Persius. 5. *Technogamia*, or the Marriage of the Arts, a comedy.

HOLINESS, or **SANCTITY**; a quality which constitutes or denominates a person or thing *holy*; i. e. pure, or exempt from sin. The word is also used in respect of persons and things that are sacred, i. e. set apart to the service of God, and the uses of religion.

HOLINESS, is also a title or quality attributed to the pope; as that of *majesty* is to kings. Even kings, when writing to the pope, address him under the venerable appellation of *Your Holiness*, or *Holy Father*; in Latin, *Sanctissime*, or *Beatissime Pater*. Anciently the same title was given to all bishops. The Greek emperors also were addressed under the title of *Holiness*, in regard of their being anointed with holy oil at their coronation. Du Cange adds, that some of the kings of England have had the same attribute; and that the orientals have frequently refused it to the pope.

HOLINSHED (Raphael), an English historian famous for the *Chronicles* under his name, was descended from a family that lived at Bosely in Cheshire; but neither the time of his birth, nor scarcely any circumstances of his life, are known. However, he appears to have been a man of considerable learning, and to have had a genius particularly adapted for history. His *Chronicles of England, Scotland, and Ireland*, were first published at London in 1570, in 2 vols folio; and then in 1587, in 3 vols. In this second edition several sheets in the 2d and 3d vols were castrated for containing some passages disagreeable to queen Elizabeth and her ministers; but the castrations have since been printed apart. Holinshed was not the sole compiler of this work, being assisted in it by several other hands. The time of his death is unknown; but from his will, which is prefixed to Hearne's edition of *Cambden's Annals*, it appears to have happened between 1578 and 1582.

HOLLAND (Philemond), M. D. commonly called the

Translator-general of his age, was educated in the university of Cambridge. He was for many years a schoolmaster at Coventry, where he also practised physic. He translated Livy, Pliny's Natural History, Plutarch's Morals, Suetonius, Ammianus Marcellinus, Xenophon's Cyropædia, and Camden's Britannia, into English; and the geographical part of Speed's Theatre of Great Britain into Latin. The Britannia, to which he made many useful additions, was the most valuable of his works. It is surprising, that a man of two professions could find time enough to translate so much; but it appears from the date of the Cyropædia, that he continued to translate till he was 80 years of age. He died in 1636, aged 85. He made the following epigram upon writing a large folio with a single pen:

With one sole pen I wrote this book,
Made of a grey goose quill;
A pen it was when it I took,
And a pen I leave it still.

HOLLAND, a celebrated republic of Europe, and principal of the Dutch States, or as they are commonly, though no longer properly called, the Seven United Provinces. Holland is a peninsula, bounded on the north and west by the German Ocean, on the east by the Zwyder See and the state of Utrecht, and on the south by the river Meuse and Brabant. It is divided into North and South. North Holland includes all to the north of Amsterdam. South Holland extends from the state of Zealand and Brabant to the river Ye; the length of the whole, including the island of Texel and the islands in the Meuse, is about ninety miles; the breadth is various, from fifteen to forty-eight. It contains twenty-nine walled towns, with many others that enjoy municipal privileges, and above 400 villages. Six large cities have seats in the States General, viz. Dort, Haerlem, Delft, Leyden, Amsterdam, and Gouda. The number of inhabitants is estimated at 800,000. The soil of the country is so soft and marshy, that but for the constant care in forming ditches and canals, it would be hardly capable of cultivation; some part of it lies even lower than the sea, from which it is secured by dykes or dams. The meadow-grounds are rich, and great numbers of milch cows are kept by the farmers, and the making of butter and cheese is one of their principal occupations. These meadows are generally under water during the winter, and the water would remain there at all times, if the inhabitants of the country had not found means to discharge them, by mills invented for this purpose, into the ditches and canals. The Hollanders are affable, industrious, laborious, absorbed in trade, excellent sailors, moderate politicians, and lovers of liberty. A free exercise of religion is allowed to all persuasions except the Roman Catholics; but Calvinism is the most prevailing. This country was anciently inhabited by the Batavians, who derived their origin from the Catti, a people of Germany. Having been obliged to abandon their country on account of civil wars, they came to establish themselves in an island, formed by the waters of the Rhine and the Wahal or Leck, and named their country *Batawia*, or *Betuwe*, from *Batton*, the son of their king. These people served in the Roman armies in quality of auxiliary troops; and historians inform us, that some of them were at the battle of Pharalia. They formed the ordinary guard of the emperor Augustus. The services which they rendered Germanicus in Germany, were so important, that the senate gave them the appellation of *brothers*. They had afterwards a considerable share in the conquest of Britain, under Plancius and Agricola. They strengthened the party of Galba, and afterwards that of Vitellius, and it was principally to their valour that Julian the Apostate was indebted for the victory which he obtained over the Germans near Strasburg. The name of Holland is by some said to be given it on account of the vast and thick forests of

wood with which it was at one time covered; *Holtlant*, in German, signifying woodland. Others are inclined to think that the Normans, who made a descent here about the year 836, gave the country this name, founding their opinion on the resemblance of names found in this country to those in Denmark and Norway the ancient residence of the Normans, as Zealand, Oland, Schagen, Bergen, &c. On the decline of the Roman empire, the Batavians, or Hollanders, having thrown off their yoke, came under the dominion of the Saxons, and then of the French, under Childeric I, king of France. The Normans and the Danes were the next masters, from the time of Charlemagne, and ravaged the country three times with fire and sword. When they were driven away, Charles the Bald, emperor and king of France, erected Holland into a county, in the year 863, in favour of Thierry, duke of Aquitaine, who, five years after, was also made count of Zealand, by Louis king of Germany. In the year 1299 the county of Holland devolved to the counts of Hainault; and, in 1436 it fell to Philip the Good, duke of Burgundy, and afterwards to the emperor Maximilian, whose descendant, Philip II, king of Spain, was the last count of Holland; the seven provinces revolting from him, and, after a long struggle, forming an independent republic. The states of the province have the title of the states of Holland and West Friesland, and are formed of the nobility and towns. By West Friesland is to be understood North Holland, which is sometimes so called, and not the state or province of Friesland. The number of the nobility admitted into the assembly is not limited, and not always the same; they are elected by a majority of votes, and rarely exceed ten. The towns who have a right to send deputies were originally six; at present they are eighteen, of which seven are in North Holland, and eleven in South Holland. The number of deputies sent by each town is not fixed. In the year 1581 the Hague was appointed to be the place for the assembly of the states, when William of Nassau, prince of Orange, was acknowledged by the states-general of the United Provinces as the chief of their republic, and most certainly to him they were chiefly indebted for their establishment when they threw off their allegiance to Spain. He was assassinated at Delft, on the 10th of July 1584. Maurice, of Nassau, succeeded his father; and, in consideration of his virtue and valour, was made governor or stadtholder of Holland, Zealand, and Utrecht. William Henry of Nassau, the grandson of Frederic Henry, brother of Maurice, obtained the three offices of stadtholder, captain, and admiral-general, with a grant of the same to his descendants for ever. In the year 1677 this prince espoused Mary, daughter of James II, king of England, and in 1689 was crowned king at Westminster. In the present disputes on the French revolution, Holland at first appeared hostile to the new republic, but never heartily to have co-operated with the allies. The stadtholder was most probably influenced by Prussia and England; but a party more powerful than his own were his enemies, and on the invasion of Holland by the French, in the beginning of the year 1795, the stadtholder, with his family, thought it prudent to take refuge in England. Such are the ways of Providence! In the year 1688, a prince of Orange came to England to obtain a crown; and in the year 1795, a prince of Orange fled hither for protection.

HOLLAND, a district of Lincolnshire in England, in the S. E. part of the county. It is divided into Upper and Lower, and lies contiguous to the shallow inlet of the sea called the Wash. In nature, as well as in appellation, it resembles the province of the same name in the Netherlands. It consists entirely of fens and marshes; some in a state of nature, but others cut by numberless drains and canals, and crossed by raised causeways. The lower or southern division is the most watery, and is preserved from constant inundations by nothing but vast banks, raised on the sea-

coast and rivers. The air is unwholesome, and the water in general so brackish as to be unfit for internal purposes; on which account the inhabitants are obliged to make reservoirs of rain-water. In summer, vast swarms of insects fill the air, and prove a great nuisance. Yet even here industry has produced comfort and opulence, by forming excellent pasture land out of the swamps and bogs, and even making them capable of producing large crops of corn. The fens too, in their native state, are not without their utility; and afford various objects of curiosity to the naturalist. The reeds with which their waters are covered, make the best thatch, and are annually harvested in great quantities for that purpose. Prodigious flocks of geese are bred among the undrained fens, forming a considerable object of commerce, as well for their quills and feathers, as for the bird itself, which is driven in great numbers to the London markets. The principal decoys in England for the various kinds of wild ducks, teal, widgeon, and other fowls of the duck kind, are in these parts. Wild geese, grebes, godwhits, whimbrels, coots, ruffs, and rees, and a great variety of other species of water-fowl, breed here in amazing numbers; and stares or starlings resort during winter, in myriads, to roost on the reeds, breaking them down by their weight. Near Spalding is the greatest heronry in England, where the herons build together on high trees, like rooks. The avoet, or yelper, is found in great numbers about Fossdike Wash, as also knots and dotterels.

NEW HOLLAND, the largest island in the world, reaching from 10 to 44 deg. S. lat. and between 110 and 154 of long. east from London. It received its name from having been chiefly explored by Dutch navigators. The land first discovered in those parts was called *Eendragt* (Concord) Land, from the name of the ship on board which the discovery was made, in 1616; 24 deg. and 25 deg. south. In 1618, another part of this coast, nearly in 15 deg. south, was discovered by Zeachen, who gave it the name of *Arnheim* and *Diemen*; though a different part from what afterwards received the name of Diemen's Land from Tasman, which is the southern extremity, in latitude 43 deg. In 1619, Jan Van Edels gave his name to a southern part of New Holland. Another part, situated between 30 and 33 deg. received the name of *Leuwen*. Peter Van Nultz gave his name, in 1627, to a coast which communicates to Leuwen's Land towards the westward; and a part of the western coast, near the tropic of Capricorn, bore the name of *De Wit*. In 1628, Peter Carpenter, a Dutchman, discovered the great gulph of Carpentaria, between 10 and 20 deg. south. In 1687, Dampier, an Englishman, sailed from Timor, and coasted the western parts of New Holland. In 1699, he left England with a design to explore this country, as the Dutch suppressed whatever discoveries had been made by them. He sailed along the western coast of it, from 28 to 15 deg. He saw the land of *Eendragt* and of *De Wit*. He then returned to Timor; from whence he went out again, and examined the isles of Papua; coasted New Guinea; discovered the passage that bears his name; called a great island which forms this passage or strait on the east side, *New Britain*; and sailed back to Timor along New Guinea. This is the same Dampier who, between 1683 and 1691, sailed round the world by changing his ships. Notwithstanding the attempts of all these navigators, however, the eastern part of this vast tract was totally unknown till Captain Cook made his voyages; and by fully exploring that part of the coast, gave his country an undoubted title to the possession of it; which accordingly has since been taken possession of under the name of *New South Wales*.

Some have disputed whether the title of *island* can be properly applied to a country of such vast extent, or whether it ought not rather to be denominated a *continent*; while others have replied, that though the word *island*, and others similar to it, do indeed signify a tract of land surrounded by sea, yet in

the usual acceptation it means only a land of moderate extent surrounded in this manner. Were it otherwise, we might call the whole world an island, as it is every where surrounded by the sea; and in fact, Dionysius Perigetes applies this term to it, with the addition of the word *immense*, to distinguish it from other islands. The best rule, according to Mr. Stockdale, for determining when a country ought to lose the name of *island* and begin to be called a *continent*, is when it begins to lose the advantages of an insular situation. The first and principal of these, is the being capable of an union under one government, and thence deriving a security from all external attacks excepting those by sea; but in countries of great extent, this is not only difficult, but impossible. If we consider, therefore, New Holland as extending about a thousand miles every way, we shall find that its claim to be called a continent is undoubted; its length from east to west being about 2400 English miles, and 2300 from north to south.

This coast was first explored by Capt. Cook in the year 1770; but his stay was too short to examine the nature of the country with the accuracy which he would otherwise have done had he continued longer in it. In general, it was found rather barren than otherwise. Many brooks and springs were found along the eastern coast, but no river of any consequence. They found only two kinds of trees useful as timber, the pine, and another which produces a sort of gum. They found three kinds of palm-trees; but few esculent plants, though there are abundance of such as might gratify the curiosity of the botanist. A great variety of birds were met with, which have since been particularly described; but the number of quadrupeds bears but a very small proportion to that of the other animals. The most remarkable insects seen at this time were the green ants. These little animals form their habitations, by bending down the leaves of trees, and glueing the ends of them together so as to form a purse. Though these leaves are as broad as a man's hand, they perform this feat by main strength, thousands of them being employed in holding down the leaves, while multitudes of others apply the glutinous matter. Captain Cook's people ascertained themselves that this was the case, by sometimes disturbing them at their work; in which case the leaf always sprung up with an elasticity which they could not have supposed that such minute insects were capable of overcoming. For this curiosity, however, they smarted pretty severely; for thousands of these little enemies instantly threw themselves upon the aggressors, and revenged themselves by their bites or stings for the interruption they had met with. These were little less painful at first than the sting of a bee; but the pain did not last above a minute. Another species of ants burrow themselves in the root of a plant which grows on the bark of trees like the mistletoe, and which is commonly as big as a large turnip. When this is cut, it appears intersected with innumerable winding passages all filled with these animals; notwithstanding which, the vegetation of the plant suffers no injury. These do not give pain by their stings, but produce an intolerable itching by crawling about on the skin. They are about the size of the small red ant in this country. Another sort, which do not molest in any manner, resemble the white ants of the East Indies, (see *TERMS*). They construct nests three or four times as big as a man's head on the branches of trees; the outsides being composed of some vegetable matter along with a glutinous substance. On breaking the outer crusts of these hives, innumerable cells appear swarming with inhabitants, in a great variety of winding directions, all communicating with each other, and with several other nests upon the same tree. They have also another house built on the ground, generally at the root of a tree; formed like an irregularly sided cone; sometimes more than six feet high, and nearly as much in diameter. The outside of these is of well-tempered clay

about two inches thick ; and within are the cells, which have no opening outward. One of these is their summer and the other their winter dwelling, communicating with each other by a large avenue leading to the ground, and by a subterraneous passage. The ground structures are proof against wet, which those on the branches are not.

This country has now become an object of more consequence than formerly, by reason of the establishment of a *British colony* in it ; where the *criminals condemned to be transported* are sent to pass their time of servitude. Before this plan was resolved on by government, another had been discussed, *viz.* that of employing these criminals in work-houses ; and Judge Blackstone, with Mr. Eden and Mr. Howard, had considered of the best method of putting it in execution : but though this plan had been approved by parliament as early as 1779, some difficulties always occurred, which prevented its going forward ; and at length, on the 6th of December 1786, orders were issued by his majesty in council for making a settlement on New Holland, establishing a court of judicature in the colony, and other regulations necessary on the occasion. The whole received the complete sanction of parliament in the beginning of the year 1787. The Squadron appointed for putting the design in execution consisted of the Sirius frigate, Captain John Hunter ; the Supply armed tender, Lieutenant H. L. Ball ; three store-ships, for carrying provisions and stores for two years ; and lastly, six transports to carry 778 convicts, of which 558 were males, with a detachment of marines in each proportioned to the nature of the service. Governor Phillip, having hoisted his flag on board the Sirius as commodore of the Squadron, weighed anchor on the 13th of May at day-break. They touched at Santa Cruz in the island of Teneriffe on the 3d of June, set sail again on the 10th, and on the 18th came in sight of the Cape Verd islands, where they steered for St. Jago. The want of a favourable wind, however, and other circumstances, prevented their getting in ; so that as Governor Phillip did not choose to waste time, they did not touch land till they came to Rio Janeiro on the coast of Brasil. It may seem surprising, that a voyage to the eastward, which of itself may be accounted of sufficient length, should thus be wilfully made so much longer, by sailing twice across the Atlantic. The calms, however, so frequent on the coast of Africa, seem of themselves to be a sufficient inducement for navigators to preserve a westerly course ; and even the islands at which it is so necessary to touch, are not far distant from the American coast. The returning tracks of Captain Cook's three voyages are all within a little space of the 45th degree of west longitude, which is even 10 degrees farther west than Cape St. Roque ; and that course appears to have been taken voluntarily, without any extraordinary inducement.

During the time of their stay at Santa Cruz the weather had been very moderate ; the barometer about 30 inches, and the thermometer never above 72. As they approached the Cape Verd islands it rose to 82, and did not exceed 82° 51' all the way from thence to Rio Janeiro. Here they met with a very favourable reception, contrary to that which Captain Cook experienced on a similar occasion. Provisions were so cheap, that though the allowance of meat was fixed by the governor at 20 ounces per day, the men were victualled completely at 3³/₄d. each, including rice, vegetables, and every other necessary. Wine was not at this time to be had except at an advanced price : but rum was laid in, and such seeds and plants procured as were thought most likely to flourish in New South Wales : particularly coffee, indigo, cotton, and the cochineal fig. An hundred sacks of cassava were likewise purchased as a substitute for bread, if it should happen to be scarce. By the kindness of the viceroy also, some deficiencies in the military stores were made up from the royal arsenal, and every assistance given

which the place could afford. They arrived here on the 5th of August 1787, and set sail on the 4th of September, receiving, as the last compliment from the governor, a salute of 21 guns.

From Rio de Janeiro the fleet had a fine run to Table Bay, in the southern extremity of Africa, which they accomplished in 39 days ; where they took in the refreshments meant to supply them during the remainder of the voyage. Here they arrived on the 13th of October ; and having provided themselves with a great number of live stock, they set sail on the 12th of November, but were long impeded by contrary winds from the south-east. On the 25th they were only 80 leagues distant from the Cape, when Governor Phillip left the Sirius and went aboard the Supply tender ; in hopes, by leaving the convoy, to gain sufficient time for examining the country round Botany Bay, that the most proper situation for the new colony might be chosen before the transports should arrive. They now met with favourable winds, blowing generally in very strong gales from the north-west, west, and south-west. The wind shifted only once to the east, but did not continue in that direction above a few hours. On the 3d of January 1788 the Supply came within sight of New South Wales ; but the winds then became variable, and a current, which at times set very strongly to the southward, impeded her course so much, that it was not till the 18th of the month that she arrived at Botany Bay.

Governor Phillip no sooner landed than he had an opportunity of *conversing with the natives*, who were assembled on shore. As it was the intention of this gentleman to conciliate if possible their friendship, he used every method at this first interview to inspire them with a favourable idea of the Europeans. For this purpose he presented them with beads and other trifling ornaments, which they seemed pleased to wear, though Captain Cook found them very indifferent about any kind of finery he could furnish them with. They seemed, according to the account of that celebrated navigator, to be so attached to their own ornaments, that they made no account of any thing else. They received indeed such things as were given them, but made no offer to return any thing in exchange ; nor could they be made to comprehend that any thing of the kind was wanted. Many of the presents which they had received were found afterwards thrown away in the woods.

Governor Phillip having parted with his new acquaintance in a friendly manner, next set about an examination of the country about Botany Bay, which had been strongly recommended by Captain Cook as the most eligible place for a settlement. He found, however, that the bay itself was very inconvenient for shipping ; being exposed to the easterly winds, and so shallow that ships even of a moderate burden could not get far enough within land to be sheltered from the fury of the ocean. Neither did the land about any part of this bay appear an eligible situation for a colony ; being in some places entirely swampy, in others quite destitute of water. Point Sutherland seemed to afford the situation most free from objections, but the ships could not approach it ; and even here the ground seemed to be universally damp and spongy : so that, on the whole, finding no place within the compass of the bay proper for the new settlement, they found themselves obliged to remove somewhere else.

The rest of the fleet arrived in two days after the Supply ; and that no time might be lost, Governor Phillip ordered the ground about Point Sutherland to be cleared, and preparations to be made for landing, while he went with several officers in three boats to examine Port Jackson, which was only three leagues distant. Here they had the satisfaction to find one of the finest harbours in the world, where 1000 sail of the line

might ride in perfect safety. On examining the different coves, one was preferred, which had a fine run of spring water, and where ships could anchor so close to the shore, that at a very small expence quays might be constructed for loading and unloading the largest vessels. This was named by the governor *Sydney Cove*, in honour of Lord Sydney, and the country around it destined for the place of settlement. It is about half a mile long, and a quarter of a mile broad at the entrance. On the governor's return to Botany Bay, the reports made to him concerning the adjacent country were so exceedingly unfavourable, that orders were immediately given for the removal of the fleet to Port Jackson. On the morning of the 25th, therefore, the governor sailed from Botany Bay, and was soon followed by the whole fleet. In the mean time, they were surprised by the appearance of two other European vessels, which had been first seen off Botany Bay on the 24th. These were found to be two French ships, named the *Astrolabe* and *Bouffola*, which had left France on a voyage of discovery under the command of M. la Peyrouse, in the year 1785. They had touched at the island of Santa Catharina on the coast of Brazil, and from thence gone by the extremity of South America into the Pacific Ocean, where they had run along by the coasts of Chili and California; after which they had visited Easter Island, Nootka Sound, Cook's River, Kamtschatka, Manilla, the Isles des Navigateurs, Sandwich, and the Friendly Isles. They had also attempted to land on Norfolk Island, but found it impossible on account of the surf. During the whole voyage none were lost by sickness; but two boats crews had unfortunately perished in a surf on the north-west coast of America; and at Masfuna, one of the *Isles des Navigateurs*, M. L'Angle, captain of the *Astrolabe*, with 12 of his people, officers and men, were murdered by the savages. This was the more surprising, as there had been an uninterrupted friendship with them from the time the French touched at the island, till the unfortunate moment that M. L'Angle went ashore with two long boats for the purpose of filling some water-casks. His party amounted to 40 men; and the natives, from whom the French had already received abundance of refreshments, did not show any signs of an hostile disposition: but from whatever motive their resentment was excited, the men had no sooner begun to get out the boats, than the savages made a most furious and unexpected assault with stones. In this encounter M. L'Angle himself, with the people above mentioned, fell a sacrifice to the treachery of these barbarians. The remainder of the party escaped with great difficulty; the ships having at that time passed a point of land which intercepted their view of the affay.

The convicts and others destined to remain in New South Wales being landed, no time was lost in beginning to clear ground for an encampment, store-houses, &c. The work, however, went on but slowly, partly owing to the natural difficulties they had to encounter, and partly owing to the habitual indolence of the convicts, which indeed was naturally to be expected considering their former way of life. Nevertheless, by the end of the first week in February, the plan of an encampment was formed, and places were marked out for different purposes, so that the colony already began to assume some appearance of order and regularity. The materials and frame-work of a slight temporary habitation for the governor had been brought out from England ready formed, which were landed and put together with as much expedition as circumstances would allow. Hospital tents were also erected; and the sickness which soon took place showed the propriety of so doing. In the passage from the Cape there had been but little sickness, and few of the convicts had died; but a little time after they landed, a dysentery began to prevail, which proved fatal in several instances, and the scurvy began to rage with

great violence, so that the hospital tents were soon filled with patients. The disorder proved the more virulent as fresh provisions could but rarely be procured; nor were esculent vegetables often obtained in such plenty as could produce any material alleviation of the complaint: the only remedy for the dysentery was found to be a kind of red gum, produced in plenty by the trees growing upon this coast. The yellow gum has the same properties, though in an inferior degree.

In the beginning of February a most violent storm of thunder and lightning destroyed five of the sheep which had a shed erected for them under a tree, which proved a prelude to other misfortunes among the cattle. The encampment, however, was carried on with great alacrity; the foundations of the store-houses were laid, and every thing began to wear a promising appearance. On the 7th of the month a regular form of government was established in the colony, with all the solemnity which could possibly be given; the governor made a proper speech to the convicts, reminding them of the situation in which they stood; and that now, if they continued their former practices, it was impossible they could hope for mercy if detected; neither could they expect to escape detection in so small a society. Offenders, therefore, he said, would certainly be punished with the utmost rigour; though such as behaved themselves in a proper manner, might always depend upon encouragement. He particularly noticed the illegal intercourse betwixt the sexes, as a practice which encouraged profligacy in every respect; for which reason he recommended marriage; and this exhortation seemed not to be altogether in vain, as 14 marriages were celebrated that very week in consequence.

Heavy rains took place during the remainder of this month, which showed the necessity of going on with the work as soon as possible. The want of carpenters, however, prevented this from being done so expeditiously as could have been wished. Only 16 of these could be hired from all the ships; and no more than 12 of the convicts were of this profession, of whom several were sick; so that the party were by far too few for the work they had to perform. An hundred convicts were added as labourers; but with every effort it was found impossible to complete either the barracks or the huts for the officers as soon as could be wished. On the 14th of February a small party was sent out to settle on Norfolk Island, who have since established a colony there which promises to be of considerable utility. It was soon found, however, absolutely necessary to make examples of some of the convicts at Port Jackson. Towards the end of February it was found necessary to convene a criminal court, in which six of the convicts received sentence of death. One who was the head of the gang was executed the same day; one of the rest was pardoned; the other four were reprieved, and afterwards exiled to a small island within the bay, where they were kept on bread and water. They had frequently robbed both the stores and other convicts. The fellow who was executed, and two others, had been detected in stealing the very day on which they received a week's provision, and at the same time that their allowance was the same as that of the soldiers, spirituous liquors only excepted.

In the beginning of March the governor went out with a small party to examine Broken Bay, lying about eight miles to the northward of Port Jackson. This was found very extensive, with many openings. One of the latter ended in several small branches, and a large lagoon, which they could not at that time examine. Most of the land about the upper part of this branch was low and full of swamps, with great numbers of pelicans, and other aquatic birds. Among the rest they met with an uncommon bird called at that time the *Hooded Gull*, but afterwards found to be the species named by Mr. Latham the *Caspian Tern*.

From this north-west branch they proceeded across the bay

to the south-west branch, which is also very extensive, with a second opening to the westward capable of affording shelter to almost any number of ships, with depth of water for vessels of almost any burden. The land was found much higher here than at Port Jackson, more rocky, and equally covered with timber. Large trees were seen growing even on the summits of the mountains, which appeared totally inaccessible to the human species. Round the headland which forms the southern entrance into the bay is a third branch, which governor Phillip thought the finest piece of water he had ever seen; which for that reason he honoured with the name of *Pitt-water*. This branch, as well as the former, is sufficient to contain all the navy of Great Britain; but the latter has a bar at the entrance of only 18 feet at low water. Within are from 7 to 15 fathoms. The land here is more level than on the south-west branch, and some situations are proper for cultivation. The governor determined to have returned by land, in order to explore the country betwixt Port Jackson and Broken Bay, but the continual rains prevented him.

On the 10th of March the French ships departed, little intercourse having passed between them and the English during the time of their stay. While the former remained in Botany Bay, Father Le Receveur, who had come out in the *Astrolabe* as a naturalist, died of the wounds he had received in the battle with the inhabitants of Mafuna. A kind of monument was erected to his memory, with the following inscription:

Hic jacet LE RECEVEUR
E FF. Minimis Gallia sacerdos,
Physicus in circumnavigatione
Mundi

Duce DE LA PEYROUSE,
Ob. 17 Feb. 1788.

This monument, however, was soon after destroyed by the natives; on which Governor Phillip caused the inscription to be engraved on copper and nailed to a neighbouring tree. M. de la Peyrouse had paid a similar tribute to the memory of Captain Clerke at Kamtschatka.

On the 15th of April, the governor, attended by several officers and a small party of marines, set out on an expedition into the interior parts of the country. Their first landing was at the head of a small cove named *Shell-cove*, near the entrance of the harbour on the north side. Proceeding in this direction, they arrived with great labour at a large lake surrounded on all sides with bog and marshy ground to a considerable extent, and in which they frequently plunged up to the waist. Here they observed that bird so rare in other parts of the world, viz. a black swan. On being fired at, it rose, and showed that its wings were edged with white, the bill being tinged red. They spent three days in a very laborious manner in passing the marshes and swamps which lie in the neighbourhood of the harbour: and here they had an opportunity of observing, that all the small streams which descend into Port Jackson proceed from swamps, occasioned by the stagnation of the water in the low grounds as it rises from the springs. On leaving these low grounds, they found them succeeded by a rocky and barren country; the hills covered with various flowering shrubs, though frequently inaccessible by reason of various natural obstacles. At about 15 miles distance from the sea, the governor had a fine view of the internal parts of the country, which were mountainous. To the most northerly chain of these he gave the name of *Carmarthen*, and to the most southerly that of *Lansdown, Hills*; and to one which lay between these he gave the name of *Richmond Hill*. It was conjectured, that a large river must rise from these mountains; but there was now a necessity for returning. On the 22d, however, another expedition was undertaken. Governor Phillip with his party landed

near the head of the harbour. Here they found a good country; but in a short time arrived at a close thicket through which they found it impossible to make their way, so that they were obliged to return. Next day, by keeping close to the banks of a small creek, they made a shift to pass that obstacle, and continued their course for three days to the westward. The country was now extremely fine, either entirely level or rising in small hills, the soil excellent, but stony in a few places. The trees grew at the distance of from 20 to 40 feet from each other, in general totally destitute of underwood, which was confined to the barren and stony spots. On the 5th day they saw for the first time in this second expedition Carmarthen and Lansdown hills; but the country all round was so beautiful, that Governor Phillip gave it the name of *Belle vue*. They were still apparently 30 miles from the mountains which they had intended to reach; but not having been able to carry more than six days provisions along with them, they found it necessary to return; and even with this small stock the officers as well as men were obliged to carry heavy loads. During all this time they had not proceeded farther in a direct line than 30 miles, so great were the obstructions they had met with from deep ravines, &c. Their return, however, was effected with much greater ease, having cleared a track; and marked trees all the way as they went along to direct them in their journey back. The country explored at this time appeared so fine, that Governor Phillip determined to form a settlement there as soon as a sufficient number could be spared from those works which were immediately necessary. On his return he had the mortification to find, that five ewes and a lamb had been killed very near the camp, and in the middle of the day. This mischief was supposed to have been done by some dogs belonging to the natives.

All this time the scurvy had continued to rage with great violence; so that by the beginning of May near 200 people were incapable of work. For this reason, and on account of the great difficulty of clearing the ground, no more than eight or ten acres of wheat and barley had been sown, besides what private individuals had sown for themselves; and it was even feared that this small crop would suffer from the depredations of ants and field-mice. To procure as much relief as possible therefore in the present exigence, the Supply was sent in the beginning of May to Lord Howe Island in hopes of procuring some turtle and other provisions; but unfortunately the vessel returned without any turtle, having met with equally weather, and being obliged to cut away her best bower anchor. The natives now began to show an hostile disposition, which they had not hitherto done. One of the convicts, who had wandered away from the rest in quest of vegetables, returned with a very dangerous wound in the back; giving information also, that another who had gone out for the same purpose had been carried off in his sight by the natives, after being wounded in the head. A shirt and hat were afterwards found in some of the huts of the natives, but no intelligence of the man could be gained. This was followed by other misfortunes of the same nature. On the 30th of the month, two men who had been employed in cutting rushes for thatch at some distance from the camp were found dead. One of them had four spears in his body, one of which had pierced quite through it; but the other had no marks of violence upon him. In this case, however, it was proved that those who suffered had been the aggressors; as they had been seen with one of the canoes of the natives which they had taken from one of the fishing places. All possible enquiry was made after the natives who had been guilty of the murder, but to no purpose. In the course of this enquiry, it was found that one of the natives had been murdered, and several wounded, previous to the attack upon the rush-cutters. The governor promised liberty to any convict who

should discover the aggressors; but no information was procured, though it is probable that it may prevent accidents of that kind for the future. About this time the two bulls and four cows belonging to government and to the governor, having been left for some time by the man who had the charge of them, strayed into the woods and could not be recovered, though they were afterwards traced to some distance.

The 4th of June being his majesty's birth-day, was celebrated with as much festivity as circumstances would allow; and on this occasion it was first made public that the governor had given the name of *Cumberland County* to this part of the territory. The appointed boundaries were Carmarthen and Lansdown hills on the west, the northern parts of Broken Bay on the north, and the southern parts of Botany Bay on the south; thus including these three principal bays, with Sydney Cove nearly in the centre.

The misfortunes which attended those convicts who strayed to too great a distance from the settlement, were not sufficient to prevent some of the rest from rambling into the woods, in hopes of subsisting themselves there and regaining their liberty. One of these, who had been guilty of a robbery, fled into the woods on the 5th of June, but was obliged to return half-starved on the 24th. He had found it impossible to subsist in the woods, and had met with very little relief from the natives. One of them gave him a fish, but made signs for him to go away. According to his account, they themselves were in a very miserable situation; and he pretended to have seen four of them apparently dying of hunger, who made signs to him for something to eat. He pretended also to have fallen in with a party who would have burnt him, and that he made his escape from them with difficulty. He said also, that he had seen the remains of a human body lying on a fire; and endeavoured to inculcate the idea of these savages eating human flesh when other provisions were scarce. This poor wretch was tried and executed for the theft he had committed before his departure, along with another criminal.

By this time the colony was so far advanced, that the plan of a regular town had been marked out. The principal street, when finished, is to be 200 feet wide, terminated by the governor's house, the main guard, and criminal court. The plans of other streets are likewise marked out; and it is the governor's intention, that when houses are built here, the grants of land shall be made with such clauses as will prevent the building of more than one house on one allotment, which is to consist of 60 feet in front and 150 in depth. Thus a kind of uniformity will be preserved in the building, narrow streets prevented, and many inconveniencies avoided, which a rapid increase of inhabitants might otherwise occasion. It has likewise been an object of the governor's attention to place the public buildings in such situations as will be eligible at all times, and particularly to give the storehouses and hospital sufficient space for future enlargement, should it be found necessary. The first huts erected in this place were composed only of the soft wood of the cabbage palm, in order to give immediate shelter, and which had the further inconvenience of being used quite green. The huts of the convicts were constructed only of upright poles wattled with slight twigs, and plastered up with clay. Buildings of stone might easily have been raised, had there been any means of procuring lime for mortar. There were three kinds of stone met with about Sydney Cove, one equal in goodness to Portland-stone, an indifferent kind of sandstone or fire-stone, and a sort which seems to contain iron; but neither chalk nor any species of lime-stone have yet been discovered. Lime was indeed procured from oyster-shells collected in the neighbouring coves to construct a small house for the governor; but it cannot be expected that a sufficient quantity can thus be procured for many or very extensive

buildings. Good clay for bricks has been found near Sydney Cove, and very good bricks have been made of it; the wood also, notwithstanding the many reports to the contrary, is found abundantly fit for various purposes after being thoroughly seasoned. Such specimens as have been sent to England were fine-grained and free of knots, but heavy.

On the point of land that forms the west side of the Cove a small observatory has been erected, the longitude of which has been ascertained to be $159^{\circ} 19' 30''$ east from Greenwich, and the latitude $32^{\circ} 52' 30''$ south. Instead of thatch they now make use of shingles made from a certain tree, which has the appearance of a fir, but produces wood like English oak.

With regard to the *state of this colony* there have been various and discordant accounts. Some of these have represented the country in such a light, that it would seem impossible to subsist on it; and it has been said, that the people who have had the misfortune to go there already were in the utmost danger of starving before any assistance could be sent from Britain. These reports, however, appear not to be well founded. Difficulties must undoubtedly be felt at the first settlement of every uninhabited country; and we are not to expect that a colony, most of whom are wretches exiled for their crimes from their own country, can thrive in an extraordinary manner for some time. It appears, indeed, that so far from the transportation to this place having had any good effect in reforming them, the governor has been obliged to execute the utmost rigour of the law by hanging several of them. A good number of others have unaccountably disappeared, and are supposed to have been murdered by the natives, or perished with hunger in the woods; so that, unless the numbers be recruited by more respectable inhabitants, it is not likely that much can be expected from the Port Jackson settlement for a long time to come. Of this, however, there seems to be little doubt: the general spirit of emigration which prevails through most, indeed we may say all the countries of Europe, will undoubtedly soon supply a sufficient number; and even some of the Americans, notwithstanding the extent and fertility of their own country, and the liberty they enjoy in it, are said to be willing to exchange these blessings for the precarious hopes of what may be obtained in New Holland among British convicts and slaves. This rambling disposition may perhaps be accounted for from an observation which has been made, *viz.* that "it may admit of a doubt whether many of the accommodations of a civilized life be not more than counterbalanced by the artificial wants to which they give birth. That these accommodations do not give a satisfaction equivalent to the trouble with which they are procured, is certain; and it is no wonder then to find numbers of people in every country who are willing to exchange them for independent ease and tranquillity, which belong, comparatively speaking, to few individuals in those countries which are called civilized."

With regard to the geography of this extensive country, which may perhaps be reckoned a fifth general division of the world, Captains Cook and Furneaux so fully explored its coasts, that succeeding navigators have added nothing to their labours. The only part which still remains unknown is that between the latitudes of $37^{\circ} 58'$ and 39° south; and as none of the fleet which lately sailed from Britain could be supposed to undertake any voyage of discovery, it is unknown whether a strait intersects the continent in this place or not. Captain Tench, however, informs us, on the authority of a naval friend, "that when the fleet was off this part of the coast, a strong set-off shore was plainly felt."

A vast chain of lofty mountains run nearly in a north and south direction farther than the eye can trace, about 60 miles inland. The general face of the country is pleasing, diversified with gentle risings and small winding valleys, covered for the

most part with large spreading trees, affording a succession of leaves in all seasons. A variety of flowering shrubs, almost all entirely new to an European, and of exquisite fragrance, abound in those places which are free from trees; and among these, a tall shrub, bearing an elegant flower, which smells like English may, is peculiarly delightful, and perfumes the air to a great distance. There are but few trees; and, as Captain Tench and others relate, of so bad a grain, that they can scarcely be used for any purpose: this, however, Mr. Stockdale ascribes to their being used in an unseasoned state, as has been already mentioned. In return for these bad qualities, however, the trees yield vast quantities of the gum already mentioned as a cure for the dysentery. It is of an acrid quality, and therefore requires to be given along with opiates. The tree which yields it is of very considerable size, and grows to a great height before it puts out any branches. The gum itself is usually compared to *sanguis draconis*, but differs from it in being perfectly soluble in water, which the *sanguis draconis* is not. It may be extracted from the wood by tapping, or taken out of the veins when dry. The leaves are narrow, and not unlike those of a willow; the wood fine grained and heavy, but warps to such a degree, when not properly seasoned, as soon to become entirely useless.

The yellow gum is properly a resin, being entirely insoluble in water. It greatly resembles gamboge, but has not the property of staining. It is produced by a low small plant with long grassy leaves; but the fructification shoots out in a surprising manner from the centre of the leaves on a single straight stem to the height of 12 or 14 feet. This stem is strong and light, and is used by the natives for making their spears. The resin is generally dug up from the soil under the tree, not collected from it, and may perhaps be the same which Tasman calls *gum lac of the ground*. It has been tried by Dr. Blane physician to St. Thomas's hospital, who found it very efficacious in the cure of old fluxes, and that in many very obstinate cases. Many of the New Holland plants have been already imported into Britain, and are now flourishing in perfection at the nursery gardens of Mr. Lee of Hammer Smith.

The soil immediately around Sydney Cove is sandy, with here and there a stratum of clay; but for some time the produce was not remarkable. The principal difficulty hitherto experienced in cleaning the ground arises from the size of the trees, which is said to be so enormous, that 12 men have been employed for five days in grubbing up one. Captain Cook speaks of some fine meadows about Botany Bay; but none of these have been seen by the present settlers, and Governor Phillip supposes them to have been swamps seen at a distance. Grass grows in almost every place, but in the swamps with the greatest vigour and luxuriance, though not of the finest quality. It is found to agree better with cows and horses than sheep. A few wild fruits are sometimes procured; among which is a kind of small purple apple mentioned by Captain Cook; and a fruit which has the appearance of a grape, but tasting like a green gooseberry, and excessively sour.

From the first discovery of this continent, the extreme scarcity of fresh water has been mentioned by every navigator. None have been fortunate enough to enter the mouth of any navigable river such as might be expected in a country of equal extent. The settlers about Port Jackson found enough for the common purposes of life; but Captain Tench informs us, that when he left the country, towards the end of 1788, there had been no discovery of a stream large enough to turn a mill. Since that time, however, Governor Phillip has been more successful; as we are informed by a letter of his to Lord Sydney, dated Feb. 13, 1790. In this letter he relates, that soon after the ships sailed in November 1788, he again made an excursion to Botany Bay, where he staid five days; but the

researches he made there tended only to confirm him in the opinion he already entertained, that the country round it was by no means an eligible situation for a colony. After having visited Broken Bay several times with boats, a river was found, which has since been traced, and all those branches explored which afforded any depth of water. This river has obtained the name of *Hawkesbury*, is from 300 to 800 feet wide, and seems navigable for the largest merchant ships as far up as Richmond hill, at which it becomes very shallow, and divides into two branches; on which account the governor calls Richmond-hill the head of the river. As after very heavy rains, however, the water sometimes rises 30 feet above its level, it would not be safe for ships to go up so far; but 15 or 20 miles below it they would lie in fresh water, and be perfectly safe.

The country about Broken Bay is at first high and rocky, but as we proceed up the river it becomes more level, the banks being covered with timber, and the soil a light rich mould, supposed to be very capable of cultivation. The other branches of this river are shallow, but probably run many miles up into the country. Great numbers of black swans and wild ducks were seen on these rivers, and the natives had several decoys for catching quails.

Richmond-hill, near which a fall prevented the boats from proceeding farther up, is the most southerly of a large range of hills which run to the northward, and probably join the mountains nearly parallel to the coast from 50 to 60 miles inland. The soil of this hill is good, and it lies well for cultivation. There is a very extensive prospect from the top, the whole country around seeming a level covered with timber. There is a flat of six or seven miles between Richmond hill and a break in the mountains which separates Lansdown and Carmarthen hills; in which flat the governor supposes that the Hawkesbury continues its course; though the river could not be seen on account of the timber with which the ground is every where covered where the soil is good. Six miles to the southward of Port Jackson is a small river; and 20 to the westward is one more considerable, which probably empties itself into the Hawkesbury. As far as this river was at that time explored, the breadth was computed at from 300 to 400 feet. It was named the *Nepean*, and, like the Hawkesbury, sometimes rises 30 feet above its level. A party who crossed the river attempted to reach the mountains, but found it impossible, probably for want of provisions. After the first day's journey they met with such a succession of deep ravines, the sides of which were frequently so inaccessible, that in five days they could not proceed farther than 15 miles. At the time they turned back, they supposed themselves to be 12 miles from the foot of the mountains. With regard to the state of the colony, it appears from this letter to be as flourishing as could in any reasonable manner be expected. Another has been formed at a place called Rosehill, at the head of the harbour of Sydney Cove. At this place is a creek, which at half flood has water for large boats to go three miles up; and one mile higher the water is fresh and the soil good. Some ground having been cleared and cultivated, the governor in the above letter writes, that 27 acres were sown with corn, and that in December the crop was got in: that the corn was exceedingly good; about 200 bushels of wheat and 60 of barley, with a small quantity of flax, Indian corn, and oats; all which is preserved for seed: that if settlers are sent out, and the convicts divided amongst them, this settlement will very shortly maintain itself; but without which this country cannot be cultivated to any advantage. "At present (continues the governor) I have only one person, who has about 100 convicts under his direction, who is employed in cultivating the ground for the public benefit, and he has returned the quantity of corn above mentioned

into the public store: The officers have not raised sufficient to support the little stock they have: some ground I have had in cultivation will return about 40 bushels of wheat into store: so that the produce of the labour of the convicts employed in cultivation has been very short of what might have been expected, and which I take the liberty of pointing out to your lordship in this place; to show as fully as possible the state of this colony, and the necessity of the convicts being employed by those who have an interest in their labour." The country for 20 miles to the westward is very capable of cultivation; though the labour of cutting down the trees is very great. At Sydney Cove the stores had been infested by a swarm of rats, which destroyed no less than 12,000lb. weight of flour and rice. The gardens also had suffered very considerably; so that, having met with such a considerable loss of provision, and a sufficient supply not being procured from the Cape, Governor Phillip thought proper to send a further detachment to Norfolk Island, where the fertility of the soil afforded great hopes of their being able in a short time to subsist themselves independent of any assistance from the stores.

With regard to the civil establishment in this colony, Governor Phillip's jurisdiction extends from 43° 49' to 10° 37' south, being the northern and southern extremities of the continent. It commences again in 135° E. long. from Greenwich; and proceeding in an easterly direction, includes all the islands within the above-mentioned latitudes in the Pacific Ocean; by which partition it is supposed that every source of litigation will be cut off, as all these are indisputably the discovery of the British navigators.

The powers of the governor are absolutely unlimited, no mention being made of a council to assist him in any thing; and as no stated time is appointed for assembling the courts similar to the assizes and gaol deliveries in England, the duration of imprisonment is altogether in his hands. He is likewise invested with a power of summoning general courts martial; but the insertion in the marine mutiny act, of a smaller number of officers than 13 being able to compose such a tribunal, has been neglected; so that a military court, should detachments be made from head quarters, or sickness prevail, may not always be found practicable to be obtained, unless the number of officers in the settlement at present be increased. The governor is allowed to grant pardons in all cases, treason and wilful murder excepted; and even in these he has authority to stay the execution of the law until the king's pleasure shall be signified. In case of the governor's death, the lieutenant governor takes his place; and on his decease, the authority is lodged in the hands of the senior officer.

It was not long after the convicts were landed that there appeared a necessity for assembling a criminal court; and it was accordingly convened by warrant from the governor. The members were the judge advocate, who presided, three naval and three marine officers. The number of members is limited by act of parliament to seven; who are expressly ordered to be officers either of his majesty's sea or land forces. The court being met, completely arrayed and armed as at a military tribunal, the judge advocate proceeds to administer the usual oaths taken by jurymen in England to each member; one of whom afterwards swears him in a like manner. This ceremony being over, the crime is laid to the prisoner's charge, and the question "guilty or not guilty" put to him. No law officer being appointed on the part of the crown, the party at whose suit he is tried is left to prosecute the prisoner entirely by himself. All the witnesses are examined on oath; and the decision must be given according to the laws of England, or "as nearly as may be, allowing for the circumstances and situation of the settlement," by a majority of votes, beginning with the youngest member, and ending with

the president of the court. No verdict, however, can be given in cases of a capital nature, unless at least five of the seven members concur therein. The evidence on both sides being finished, and the prisoner's defence heard, the court is cleared, and, on the judgment being settled, is thrown open again, and sentence pronounced. During the time of sitting, the place in which it is assembled is directed to be surrounded by a guard under arms, and admission granted to every one who chooses to enter it. Of late, however, says Captain Tench, our colonists are supposed to be in such a train of subordination, as to make the presence of so large a military force unnecessary; and two sentinels in addition to the provost-martial are considered as sufficient.

The first trials which came before this court were those of three convicts, one of whom was convicted of having struck a marine with a cooper's adze, and behaving otherwise in a most scandalous and riotous manner. For this he was condemned to receive 150 lashes, being a smaller punishment than a soldier would have suffered in a similar case. A second, for having committed a petty theft, was sent to a small barren island, and kept there on bread and water only for a week. The third was sentenced to receive 50 lashes; but being recommended by the court to the governor, had his sentence remitted. The same lenity, however, could not be observed in all cases. One fellow, who had been condemned to be hanged, was pardoned while the rope was about his neck, on condition that he would become the common executioner ever after. He accepted the horrid office, but not without a *pause*. Some examples of severity were undoubtedly necessary; and among these it is impossible to avoid feeling some regret for the fate of one who suffered death for stealing a piece of soap of eight-pence value: but by the last letter of Governor Phillip, we are informed that the convicts in general are now behaving much better: more so indeed than ever he expected. The last statement was of one woman who had suffered for a robbery; five children had died, and 28 been born. The whole amount of the deaths 77, of the births 87.

The number of convicts already sent to New South Wales amounts to 2000 and upwards—above 1800 are since embarked for that settlement. The annual expence of the civil and military establishments at that place is nearly 10,000l.

Besides the criminal court, there is an inferior one composed of the judge advocate, and one or more justices of the peace, for the trial of small misdemeanors. This court is likewise empowered to decide all law-suits; and its verdict is final, except where the sum exceeds 300l. in which case an appeal can be made to England from its decree. In case of necessity, an admiralty court, of which the lieutenant-governor is judge, may also be summoned for the trial of offences committed on the high seas.

The quadrupeds on the continent of New Holland hitherto discovered are principally of the Opossum kind, of which the most remarkable is the Kangaroo. There is also a species of dogs very different from those known in Europe. They are extremely fierce, and never can be brought to the same degree of familiarity with those we are acquainted with. Some of them have been brought to England, but still retain their usual ferocity. There are a great many beautiful birds of various kinds; among which the principal are the black swans already mentioned, and the ostrich or cassowary; which last arrives frequently at the height of seven feet or more. Several kinds of serpents, large spiders, and scorpions, have also been met with. There are likewise many curious fishes; though the finny tribe seem not to be so plentiful on the coast as to give any considerable assistance in the way of provisions for the colony. Some very large sharks have been seen in Port Jackson, and two smaller species, one named the Port Jackson shark, the

other Watts's shark. The latter, notwithstanding its diminutive size, the mouth scarce exceeding an inch in breadth, is excessively voracious. One of them having been taken and flung down upon the deck, lay there quiet for *two hours*; after which Mr. Watts's dog happening to pass by, the fish sprung upon it with all the ferocity imaginable, and seized it by the leg in such a manner that the animal could not disengage himself without assistance.

The climate of this continent appears not to be disagreeable, notwithstanding the violent complaints which some have made about it. The heat has never been excessive in summer, nor is the cold intolerable in winter. Storms of thunder and lightning are frequent; but these are common to all warm countries; and it has been supposed (though upon what foundation does not well appear) that were the country cleared of wood, and inhabited, these would in a great measure cease. A shock of an earthquake has likewise been felt; but these natural calamities are incident to some of the finest countries in the world. It is not known whether there are any volcanoes or not.

The inhabitants of New Holland are by all accounts represented as the most miserable and savage race of mortals, perhaps, existing on the face of the earth. They go entirely naked; and though pleased at first with some ornaments which were given them, they soon threw them away as useless. It does not appear, however, that they are insensible of the benefits of clothing, or of some of the conveniencies which their new neighbours are in possession of. Some of them, whom the colonists partly clothed, seemed to be pleased with the comfortable warmth they derived from it; and they all express a great desire for the iron tools which they see their neighbours make use of. Their colour, in the opinion of Captain Cook, is rather a deep chocolate than a full black; but the filth with which their skins are covered, prevents the true colour of them from appearing. At some of their interviews with the colonists, several droll instances happened of their mistaking the negroes among the colonists for their own countrymen. Notwithstanding their disregard for European finery, they are fond of adorning, or rather deforming, their bodies with scars; so that some of them cut the most hideous figure that can be imagined. The scars themselves have an uncommon appearance. Sometimes the flesh is raised several inches from the skin, and appears as if filled with wind; and all these seem to be reckoned marks of honour among them. Some of them perforate the cartilage of the nose and thrust a large bone through it, an hideous kind of ornament humorously called by the sailors their *sprit-sail yard*. Their hair is generally so much clotted with the red gum already mentioned, that they resemble a mop. They also paint themselves with various colours like most other savages: they will also sometimes ornament themselves with beads and shells, but make no use of the beautiful feathers procurable from the birds of the country. Most of the men want one of the fore teeth in the upper jaw; a circumstance mentioned by Dampier and other navigators; and this also appears to be a badge of honour among them. It is very common among the women to cut off the two lower joints of the little finger; which, considering the clumsiness of the amputating instruments they possess, must certainly be a very painful operation. This was at first supposed to be peculiar to the married women, or those who had borne children, but some of the oldest women were found without this distinction, while it was observed in others who were very young.

The New Hollanders appear extremely deficient in the useful arts. Of the cultivation of the ground they have no notion: nor can they even be prevailed upon to eat bread or dressed meat. Hence they depend entirely for subsistence on the fruits and roots they can gather, with the fish they

catch. Governor Phillip also mentions their frequent setting fire to the grass, in order to drive out the opossums and other animals from their retreats; and we have already taken notice of their using decoys for quails. As all these resources, however, must be at best precarious, it is no wonder that they are frequently distressed for provisions. Thus, in the summer-time they would eat neither the shark nor sting ray; but in winter any thing was acceptable. A young whale being driven ashore, was quickly cut in pieces and carried off. They broiled it only long enough to scorch the outside; and in this raw state they eat all their fish. They broil also the fern root, and another whose species is unknown. Among the fruits used by them is a kind of wild-fig; and they eat also the kernels of a fruit resembling the pine apple. The principal part of their subsistence, however, is fish; and when these happened to be scarce, they would often watch their opportunity when the colonists hauled the seine, and seize on the whole, though a part had formerly been offered or given them. They sometimes strike the fish from the canoes with their spears, sometimes catch them with hooks, and also make use of nets, contrary to the assertion of Dr. Hawkesworth, who says that none of these are to be met with among them. Their nets are generally made of the fibres of the flax plant, with very little preparation, and are strong and heavy; the lines of which they are composed twisted like whip-cord. Some of them, however, appear to be made of the fur of an animal, and others of cotton. The meshes of their nets are made of very large loops artificially inserted into each other, but without any knots. Their hooks are made of the inside of a shell, very much resembling mother-of-pearl. The canoes in which they fish are nothing more than large pieces of bark tied up at both ends with vines; and considering the slight texture of these vessels, we cannot but admire the dexterity with which they are managed, and the boldness with which they venture in them out to sea. They generally carry fire along with them in these canoes, to dress their fish when caught. When fishing with the hook, if the fish appears too strong to be drawn ashore by the line, the canoe is paddled to the shore; and while one man gently draws the fish along, another stands ready to strike it with a spear, in which he generally succeeds. There is no good reason for supposing them to be cannibals, though they never eat animal substances but raw or next to it. Some of their vegetables are poisonous when raw, but deprived of this property when boiled. A convict unhappily experienced this by eating some in an unprepared state; in consequence of which he died in 24 hours. The dislike of the New Hollanders to the European provisions has already been mentioned: if bread be given them, they chew and spit it out again, seldom choosing to swallow it. They like salt beef and pork rather better; but they could never be brought to taste spirits a second time.

The huts of these savages are formed in the most rude and barbarous manner that can be imagined. They consist only of pieces of bark laid together in the form of an oven, open at one end, and very low, though long enough for a man to lie at full length. There is reason, however, to believe, that they depend less on them for shelter than on the caverns with which the rocks abound. They go invariably naked, as has already been observed; though we must not imagine that the custom of going naked injures them so to the climate as to make them insensible to the injuries of the weather. The colonists had repeated opportunities of observing this, by seeing them shivering with cold in the winter time, or huddling together in heaps in their huts or in caverns, till a fire could be kindled to warm them. It is probable, however, notwithstanding their extreme barbarity, that some knowledge of the arts will soon be introduced among them, as some have been seen attentively considering the utensils and conveniencies of the Europeans, with a view, seeming-

ly, of making similar improvements of their own. It has also been observed, that in some things they possess a very great power of imitation. They can imitate the songs and language of the Europeans almost instantaneously, much better than the latter can imitate theirs by long practice. Their talent for imitation is also discernible in their sculptures representing men and other animals every where met with on the rocks; which, though rude, are very surprising for people who have not the knowledge even of constructing habitations in the least comfortable for themselves, or even clothes to preserve them from the cold.

In their persons, the New Hollanders are active, vigorous, and stout, though generally lean. Dampier asserts that they have a dimness of sight; though later navigators have determined this to be a mistake, ascribing to them, on the contrary, a quick and piercing sight. Their sense of smelling is also very acute. One of them having touched a piece of pork, held out his finger for his companion to smell with strong marks of disgust. The only kind of food they eagerly accept of is fish. Their behaviour with regard to the women has been hitherto unaccountable to the colonists. Few of them, comparatively speaking, have been seen; and these have sometimes kept back with the most jealous sensibility; sometimes offered with the greatest familiarity. Such of the females as have been seen, have soft and pleasing voices; and notwithstanding their barbarism and excessive rudeness, seem not to be entirely destitute of modesty.

The New Hollanders generally display great personal bravery on the appearance of any danger. An old man, whom governor Phillip had treated with some familiarity, took occasion to steal a spade; but being taken in the fact, the governor gave him a few slight slaps on the shoulder; on which the old man caught hold of a spear, and, coming up to him, seemed for some time determined to strike, though had he done so it would have been impossible for him to escape, being then surrounded by the officers and soldiers. No encounters between parties of the natives themselves have been observed, though from some circumstances it appears that wars are carried on among them. They have more than once been seen assembled as if bent on some expedition. An officer one day met 14 of them marching along in a regular Indian file through the woods, each man having a spear in one hand and a stone in the other. A chief appeared at their head, who was distinguished from the rest by being painted. They passed on peaceably, though greatly superior in number to our people. On another occasion they offered no hostilities when assembled to the number of 200 or 300, and meeting the governor attended only by a small party. With all their courage, however, they are much afraid of a musket, and almost equally so of a red coat, which they know to be the martial dress of the Europeans. The mischief which they have hitherto done has been exercised only on some straggling convicts, most of whom probably have been the first aggressors.

Though these savages allow their beards to grow to a considerable length, it does not appear that they look upon them to be any ornament, but rather the contrary, as appears from the following instance. Some young gentlemen belonging to the *Sirius*, one day met an old man in the woods with a beard of considerable length. This his new acquaintance let him know that they would rid him of, stroking their chins, and showing him the smoothness of them at the same time. At length the old fellow consented; and one of the youngsters taking a pen-knife from his pocket, and making the best substitute for lather he could, performed the operation with such success that the Indian seemed highly delighted. In a few days he paddled alongside of the *Sirius* again, pointing to his beard; but could not by any means be prevailed upon to enter the ship. On this a barber was sent down to him, who again freed him from his

beard, at which he expressed the utmost satisfaction. It has, however, been found impossible to form any kind of permanent intercourse with the natives, though many attempts have been made for that purpose; but in his letter above quoted, governor Phillip declares that he has not the least apprehension of their doing any damage to the colony. At first the colonists imagined the spears of the New Hollanders to be very trivial weapons; but it now appears that they are capable of inflicting very grievous and mortal wounds. They are sometimes pointed with a sharp piece of the same reed of which the shafts are made, but more frequently with the sharp bone of the sting-ray. They certainly burn their dead; which perhaps has given rise to the report of their being cannibals. Governor Phillip, observing the ground to be raised in several places, caused one of these tumuli to be opened, in which were found a jaw-bone half consumed and some ashes. From the manner in which the ashes are deposited, it appears that the body has been laid at length, raised from the ground a little space, and consumed in that posture; being afterwards lightly covered with mould.

The only domestic animals they have are the dogs already mentioned, which resemble the fox-dog of England. In their language these animals are called *dingo*; but all other quadrupeds without exception they name *kangaroo*.—They seem very little given to thieving in comparison with the inhabitants of most of the South Sea islands; and are very honest among themselves, leaving their spears and other implements open on the beach, in full and perfect security of their remaining untouched. They are very expert at throwing their javelins, and will hit a mark with great certainty at a considerable distance; and it seems that sometimes they kill the kangaroo with this weapon, as a long splinter of one of the spears was taken out of the thigh of one of these animals, the flesh having closed over it completely. The people are more numerous than was at first imagined, though still the number of inhabitants must be accounted few in comparison to the extent of country; and there is great reason to believe that the interior parts are uninhabited.

The New Hollanders bake their provisions by the help of hot stones, like the inhabitants of the South Sea islands. They produce fire with great facility according to Captain Cook, but with difficulty according to later accounts, and spread it in a wonderful manner. To produce it, they take two pieces of dry soft wood; one is a stick about eight or nine inches long, the other piece is flat. The stick they shape into an obtuse point at one end; and pressing it upon the other, turn it nimbly, by holding it between both their hands, as we do a chocolate-mill; often shifting their hands up, and then moving them down upon it, to increase the pressure as much as possible. By this method they get fire in less than two minutes; and from the smallest spark they increase it with great speed and dexterity. "We have often seen (says Captain Cook) one of them run along the shore, to all appearance with nothing in his hand, who stooping down for a moment, at the distance of every fifty or an hundred yards left fire behind him, as we could see, first by the smoke, and then by the flame along the drift of wood and other litter which was scattered along the place. We had the curiosity to examine one of these planters of fire when he set off, and we saw him wrap up a small spark in dry grass, which when he had run a little way, having been fanned by the air that his motion produced, began to blaze; he then laid it down in a place convenient for his purpose, inclosing a spark of it in another quantity of grass, and so continued his course."

HOLLAND in commerce, a fine and close kind of linen, so called from its being first manufactured in Holland.

HOLLAR (Wenceslaus), a celebrated engraver, born at Prague in 1607. His parents were in a genteel line of life; and he was at first designed for the study of the law. But the civil commotions, which happened in his youth, ruining his

family affairs, he was obliged to shift for himself; and by discovering some genius for the arts, he was placed with Marian, a very able designer and engraver of views. Being himself a man of great ingenuity, he profited hastily from the instruction of his tutor. He principally excelled in drawing geometrical and perspective views and plans of buildings, ancient and modern cities and towns; also landscapes, and every kind of natural and artificial curiosities; which he executed with a pen in a very peculiar style, excellently well adapted to the purpose. He travelled through several of the great cities of Germany; and, notwithstanding all his merit, met with so little encouragement, that he found it very difficult to support himself. The earl of Arundel being in Germany took him under his protection, brought him to England, and recommended him to the favour of Charles I. He engraved a variety of plates from the Arundel collection, and the portrait of the earl himself on horseback. The civil wars, which happened soon after in England, ruined his fortune. He was taken prisoner, with some of the royal party, and with difficulty escaped; when he returned to Antwerp, and joined his old patron the earl of Arundel. He settled in that city for a time, and published a considerable number of plates; but his patron going to Italy soon after for the benefit of his health, Hollar fell again into distress, and was obliged to work for the print and booksellers of Antwerp at very low prices. At the restoration he returned into England; where, though he had sufficient employment, the prices he received for his engravings were so greatly inadequate to the labour necessarily required, that he could but barely subsist; and the plague, with the succeeding fire of London, putting for some time an effectual stop to business, his affairs were so much embarrassed, that he was never afterwards able to improve his fortune. It is said that he used to work for the booksellers at the rate of four-pence an hour; and always had an hour-glass before him. He was so very scrupulously exact, that when obliged to attend the calls of nature, or whilst talking, though with the persons for whom he was working and about their own business, he constantly laid down the glass, to prevent the sand from running. Nevertheless, all his great industry, of which his numerous works bear sufficient testimony, could not procure him a sufficient maintenance. It is melancholy to add, that on the verge of his 70th year, he was attached with an execution at his lodgings in Gardener's lane, Westminster; when he desired only the liberty of dying in his bed, and that he might not be removed to any other prison than the grave: a favour which it is uncertain whether he obtained or not. He died, however, in 1677.—His works amount nearly to 24,000 prints, according to Vertue's Catalogue; and the lovers of art are always zealous to collect them. Generally speaking, they are etchings performed almost entirely with the point; and their merits are thus characterised by Mr. Strutt: "They possess great spirit, with astonishing freedom and lightness, especially when we consider how highly he has finished some of them. His views of abbeys, churches, ruins, &c. with his shells, mussels, and every species of still life, are admirable; his landscapes frequently have great merit; and his distant views of towns and cities are not only executed in a very accurate, but a very pleasing manner." A somewhat colder character is given of them by Mr. Gilpin in his Essay on Prints: "Hollar gives us views of particular places, which he copies with great truth, unornamented as he found them. If we are satisfied with exact representations, we have them no where better than in Hollar's works: but if we expect pictures, we must seek them elsewhere. Hollar was an antiquarian and a draughtsman; but seems to have been little acquainted with the principles of painting. Stiffness is his characteristic, and a painful exactness void of taste. His larger views are mere plans. In some of his smaller, at the expence of infinite pains, something of an effect is sometimes produced.

But in general, we consider him as a repository of curiosities, a record of antiquated dresses, abolished ceremonies, and edifices now in ruins."

HOLLOA, in the sea-language, an exclamation of answer, to any person who calls to another to ask some question, or to give a particular order. Thus, if the master intends to give any order to the people in the main top, he previously calls, *Main-top, hoay!* to which they answer, *Holloa!* to show that they hear him, and are ready. It is also the first answer in hailing a ship at a distance. See **HAILING**.

HOLLY, in botany. See **ILEX**.

Sea-HOLLY. See **ERYNGIUM**.

HOLM (Sax. *bulmus*, *insula amnica*), denotes an isle or fen-ny ground, according to Bede; or a river-island. And where any place is called by that name, and this syllable is joined with any other in the names of places, it signifies a place surrounded with water; as the Flatholmes and Stepholmes in the Severn near Bristol: but if the situation of the place is not near the water, it may then signify a hilly place; *holm* in Saxon signifying also "a hill or cliff."

HOLME, a small town of Cumberland, with a market on Saturday. It is sometimes called Abbey-Holme, from an abbey that formerly stood there. It is seated on an arm of the sea, 12 miles N. of Cocker-mouth, and 310 N. N. W. of London. W. lon. 3. 19. N. lat. 54. 53.

HOLMESDALE, a rough and woody tract in Surrey, lying immediately beneath the hills to the S. and E. of that county, and extending into Kent. Red deer are still found there; and it is said to have taken its name from the holm oak with which it abounds.

HOLOCAUST, formed from *ὅλος* "whole," and *καίω* "I consume with fire," a kind of sacrifice, wherein the whole offering is burnt or consumed by fire, as an acknowledgement that God, the creator, preserver, and lord of all, was worthy of all honour and worship, and as a token of men's giving themselves entirely up to him. It is called also in Scripture a *burnt offering*. Sacrifices of this sort are often mentioned by the heathens as well as Jews; particularly by Xenophon, *Cyræid. lib. viii. p. 464. ed. Hutchins. 1738*, who speaks of sacrificing holocausts of oxen to Jupiter, and of horses to the sun: and they appear to have been in use long before the institution of the other Jewish sacrifices by the law of Moses; (see Job i. 5. xlii. 8. and Gen. xxii. 13. viii. 20). On this account, the Jews, who would not allow the Gentiles to offer on their altar any other sacrifices peculiarly enjoined by the law of Moses, admitted them by the Jewish priests to offer holocausts; because these were a sort of sacrifices prior to the law, and common to all nations. During their subjection to the Romans, it was no uncommon thing for those Gentiles to offer sacrifices to the God of Israel at Jerusalem. Holocausts were deemed by the Jews the most excellent of all their sacrifices. It is said, that this kind of sacrifice was in common use among the heathens, till Prometheus introduced the custom of burning only a part, and reserving the remainder for his own use. See **SACRIFICE**.

HOLOFERNES, lieutenant general of the armies of Nabuchodonosor king of Assyria, who having in a remarkable encounter overcome Arphaxad king of the Medes, sent to all the neighbouring nations with an intention of obliging them this way to submit to his empire, pretending that there could be no power capable of resisting him. At the same time Holofernes, at the head of a powerful army, passed the Euphrates, entered Cilicia and Syria, and subdued almost all the people of those provinces.

Being resolved to make a conquest of Egypt, he advanced towards Judæa, little expecting to meet with any resistance from the Jews. In the mean time he was informed that they were preparing to oppose him; and Achior the commander of

The Ammonites, who had already submitted to Holofernes, and was with some auxiliary troops in his army, represented to him that the Hebrews were a people protected in a particular manner by God Almighty so long as they were obedient to him; and therefore he should not flatter himself with expectations of overcoming them, unless they had committed some offence against God, whereby they might become unworthy of his protection. Holofernes, disregarding this discourse, commanded Achior to be conveyed within sight of the walls of Bethulia, and tied to a tree, and left there, whither the Jews came and loosed him.

In the mean time Holofernes formed the siege of Bethulia; and having cut off the water which supplied the city, and set guards at the only fountain which the besieged had near the walls, the inhabitants were soon reduced to extremity, and resolved to surrender, if God did not send them succours in five days. Judith, being informed of their resolution, conceived the design of killing Holofernes in his camp. She took her finest clothes, and went out of Bethulia with her maid-servant; and being brought to the general, she pretended that she could no longer endure the sins and excesses of the Jews, and that God had inspired her with the design of surrendering herself to him. —As soon as Holofernes saw her, he was taken with her beauty; and some days after invited her to a great feast, which he prepared for the principal officers of his army. But he drank so much wine, that sleep and drunkenness hindered him from satisfying his passion. Judith, who in the night was left alone in his tent, cut off his head with his own sword; and departing with her servant from the camp, she returned to Bethulia with the head of Holofernes. As soon as it was day, the besieged made a rally upon their enemies, who going into their general's tent, found his headless carcase weltering in its own blood. They then discerned that Judith had deceived them, and fled with precipitation, leaving the camp abounding with rich spoils: the Jews pursued them, killed a great number of them, and returned loaded with booty.

There is a great diversity of opinions concerning the time when this war between Holofernes and the Jews happened. Some date it from the captivity of Babylon, in the reign of Manasseh, and pontificate of Eliakim the high-priest; others place it at some time after the captivity; and some doubt the truth of the whole transaction.

HOLOGRAPHUM, composed of *ὅλος*, all, and *γραφω* I write, in the civil law, something written wholly in the handwriting of the person who signs it. The word is chiefly used in speaking of a testament written wholly in the testator's own hand. The Romans did not approve of holographic testaments; and, though Valentinian authorised them by a novel, they are not used where the civil law is in full force.

HOLOSTEUM, in botany; a genus of the trigynia order, belonging to the triandria class of plants; and in the natural method ranking under the 22d order, *Caryophyllei*. The calyx is pentaphyllous; the petals five; the capsule unilocular, and nearly cylindrical, opening at top.

HOLOTHURIA, in zoology, a genus belonging to the order of vermes mollusca. The body detached, naked, gibbous, terminated by the anus. Many tentacula at the other extremity, surrounding the mouth. There are nine species, (see Plate 10b.) all inhabitants of the ocean. The following descriptions of three species are given by Mr. Barbut.

1. The *tremula*, or quivering holothuria, "commonly measures eight inches in length when dead; but alive it extends itself to more than a foot, or contracts its body into a ball. Its figure is cylindric, the diameter of which is every way equal to an inch and a few lines. The back of a dark brown prondly bears a variety of fleshy pyramid like nipples, of a dark colour likewise at their basis, but white at their apex. They are

observed to be of two different sizes; the larger occupy the length of the back, in number 14 on each side, at the distance of six lines one from the other, when the holothuria is contracted, but the intervening space is full eight lines when the animal is extended. Others like these are placed here and there promiscuously. The less are scattered in like manner, without order, in every part of the back. Out of them all exudes a whitish mucilage serving to lubricate the body. Hence all the foresaid nipples seem to be so many glands furnished with an excretory duct, the aperture of which is so minute as not to be discoverable by the help of a common glass. That they are moreover provided with various muscles follows hence, that the holothuria can raise and obliterate them at pleasure. While the larger papillæ are quite erect, their axis and the diameter of their base measures three lines. The belly or part opposite to the back in the holothuria is of a pale brown and set all over with cylindric tentacula, in such numbers that the head of a pin could scarce find room between. Their diameter is not much above a line, and their length is that of four lines. They are of a shining whiteness, except the extremity, which is of a dark colour and shaped like a socket. By the help of these tentacula the holothuria fixes its body at the bottom of the sea, so as not to be easily forced away by tempests, which would otherwise happen the more frequently, as this zoophite dwells near the shores where the water scarce rises to a fathom's height. Now if it adheres to other bodies by means of its ventral tentacula, their point must necessarily have the form of a socket, as the cuttle-fish, sea-urchins, and star-fish have theirs shaped, by which they lay hold of any other body. From this situation of the holothuria at the bottom of the sea, which it also retains when kept in a vessel filled with sea-water, it must be evident to any one, that I have not groundlessly determined which was its back, and which its belly, which otherwise in a cylindric body would have been a difficult task. But as all animals uniformly walk or rest upon their bellies, and the holothuria has likewise that part of its body turned to the earth on which the cylindric tentacula are to be seen, it is clear that part is the abdomen or belly of this zoophite. However, both the abdominal and dorsal tentacula are raised and obliterated at the animal's pleasure; from which it is no light conjecture to conclude, that they are furnished with elevating and depressing muscles, and particularly because all the foresaid tentacula disappear after the animal's death: and hence it farther appears, that all naturalists have given the representation of a dead holothuria, seeing they have assigned it no tentacula. I entertain some doubt whether the illustrious Linnæus himself did not draw his generical character of the holothuria from a dead subject, as he makes no mention of these tentacula."

2. The *physalis*, or bladder shaped holothuria. The body of this species is oval, approaching to triangular, of a glossy transparency; the back sharp edged, of a dark green colour, whence run out a number of finews: anteriorly the body is of a reddish hue. The trunk spiral, reddish towards the thicker end. Many tentacula of unequal length under that thicker end; the shorter ones are taper and thicker, the middle ones capillary, the point clay colour and in shape like a ball; the rest, which are longer, are filiform, of which the middlemost is thicker and twice as long. Brown, in his Jamaica, calls it a diaphanous bladder with numerous tentacula representing a man's belly; above it is furnished with a comb full of cells; under the other extremity hang a number of branchy tentacula. It inhabits the seas.

3. The *pentactes*, or five-rowed holothuria, has the mouth encompassed with tentacula, the body bearing tentacula five different ways. The animal is of a red colour, nearly oval, or somewhat cylindrical, assuming various shapes. The mouth is set round with ten rays bristly at the points; the body

longitudinally dotted in five places with clay-coloured hollow warts, situate two together. It inhabits the sea of Norway, taking in and casting out again the water, as it either swims or dives to the bottom.

HOLSTEIN, a duchy of Germany, bounded by the German ocean on the west; the Baltic, or the gulph of Lubeck, on the east; the duchy of Mecklenburg on the south-east; that of Bremen, with the river Elbe, on the south-west; and Lauenburg, with the territory of Hamburg, on the south. Its greatest length is about 80 miles, and its breadth 60. The diocese of Eutin, and the county of Ranzau, though they make a part of the duchy of Holstein, yet being lands belonging to the empire and circle, shall be described separately.

A great part of this country consists of rich marsh-land, which being much exposed to inundations both from the sea and rivers, dykes have been raised at a great expence to guard and defend them. The pastures in the marshes are so rich, that cattle are bred in vast numbers and fattened in them, and great quantities of excellent butter and cheese made of their milk. They are also very fruitful in wheat, barley, pease, beans, and rape seed. In the more barren, sandy, and heathy parts of the country, large flocks of sheep are bred and grazed: nor are orchards wanting, or woods, especially of oak and beech; nor turf, poultry, game, and wild fowl. Here is a variety both of sea and river fish; and the beef, veal, mutton, and lamb, are very fat and palatable. Holstein is also noted for beautiful horses. The gentry usually farm the cows upon their estates to a Hollander, as he is called, who for every cow pays from six to ten rix-dollars; the owner providing pasture for them in summer, and straw and hay in winter. It is no uncommon thing here to drain the ponds and lakes once in three or four years, and sell the carp, lampreys, pikes, and perch, found in them; then sow them for several years after with oats, or use them for pasture; and after that lay them under water again, and breed fish in them. There are hardly any hills in the country; but several rivers, of which the principal are the Eyder, the Stor, and the Trave. The duchy contains about 30 towns, great and small: most part of the peasants are under villenage, being obliged to work daily for their lords, and not even at liberty to quit their estates. The nobility and the proprietors of manors are possessed of the civil and criminal jurisdiction, with other privileges and exemptions. Formerly there were diets, but now they seem to be entirely laid aside: meetings, however, of the nobility are still held at Kiel. The predominant religion here is Lutheranism, with superintendencies as in other Lutheran countries. In several places the Jews are allowed the exercise of their religion. At Gluckstadt and Altena are both Calvinist and Popish churches; and at Kiel a Greek Russian chapel. Besides the Latin schools in the towns, at Altena is a gymnasium, and at Kiel an university. Notwithstanding this country's advantageous situation for commerce, there are few manufactures and little trade in it. Hamburg and Lubeck supply the inhabitants with what they want from abroad; from whence and Altena they export some grain, malt, groats, starch, buck-wheat, pease, beans, rapeseed, butter, cheese, sheep, swine, horned cattle, horses, and fish. The manufactures of the duchy are chiefly carried on at Altena, Kiel, and Gluckstadt. The duchy of Holstein consists of the ancient provinces of Holstein, Stormar, Ditmarsh, and Wagria. It belongs partly to the king of Denmark and partly to the dukes of Holstein Gottorp and Ploen. Anciently the counts of Holstein were vassals of the dukes of Saxony; but afterwards they received the investiture of their territories from the emperor, or the bishops of Lubeck in the emperor's name, though now the investiture is given by the emperor in person. The king of Denmark appoints a regency over his part of Holstein and the duchy of Sleswick, which has its office at Gluckstadt. The

seat of the great-duke's privy council and regency court, together with the chief consistory, which is united to it, is at Kiel: there are many inferior courts and consistories, from which an appeal lies to the higher. In the duchy of Holstein, the government of the convents and nobility is alternately in the king and duke for a year, from Michaelmas to Michaelmas. The person in whom the government is lodged administers it by his regency. In some cases an appeal lies from this court to the Aulic council or chamber at Wetzlar: the convents, the nobility, and the proprietors of manors in the country, have a civil and criminal jurisdiction over their estates. The revenues of the sovereigns arise principally from their demesnes and regalia; besides which, there is a land and several other taxes and imposts. The duke's income, setting aside his ducal patrimony, has been estimated at 70,000 or 80,000 pounds. The king usually keeps here some regiments of foot and one of horse. With respect to the duke's military force, it amounts to about 800 men. The king, on account of his share in this country, styles himself *duke of Holstein, Stormar, and Ditmarsh*. The dukes both of the royal and princely house style themselves *heirs of Norway, dukes of Sleswick, Holstein, Stormar, and Ditmarsh*, and counts of *Oldenburg and Delmenhorst*. On account of Holstein, both the king of Denmark and the grand duke have a seat and voice in the college of the princes of the empire, and in that of the circle. Together with Mecklenburg they also nominate an assessor for this circle in the Aulic chamber. The matricular assessment of the whole duchy is 40 horse and 80 foot, or 800 florins; to the chamber of Wetzlar both princes pay 189 rix-dollars, 31 kruitzers. In 1735, duke Charles Frederic of Holstein-Gottorp founded an order of knighthood here, viz. that of St. Anne, the ensign of which is a red cross, enamelled, and worn pendent at a red ribbon edged with yellow.—The principal places of that part of the duchy belonging to the king of Denmark and the duke of Ploen are Gluckstadt, Itzhoe, Rendsburg, and Ploen; and that part belonging to the great-duke are Kiel, Oldenburg, Preetz, and Altena.

HOLSTENIUS (Lucas), an ingenious and learned German, born at Hamburg in 1596, was bred a Lutheran; but being converted to popery by father Sirmond the Jesuit, he went to Rome, and attached himself to cardinal Francis Barberini, who took him under his protection. He was honoured by three popes; Urban VIII. gave him a canonry of St. Peter's; Innocent X. made him librarian of the Vatican; and Alexander VII. sent him in 1655 to queen Christina of Sweden, whose formal profession of the Catholic faith he received at Inspruck. He spent his life in study, and was very learned both in sacred and profane antiquity. He died in 1661; and though he was not the author of any great works, his notes and dissertations, on the works of others have been highly esteemed for the judgment and precision with which they are drawn up.

HOLT (Sir John), knight, eldest son of Sir Thomas Holt, serjeant at law, was born in 1642. He entered himself of Gray's Inn in 1658; and applied to the common law with so much industry, that he soon became a very eminent barrister. In the reign of James II. he was made recorder of London, which office he discharged with much applause for about a year and a half; but lost his place for refusing to expound the law suitably to the king's designs. On the arrival of the prince of Orange, he was chosen a member of the convention parliament, which afforded him a good opportunity of displaying his abilities; so that, as soon as the government was settled, he was made lord chief justice of the court of king's bench, and a privy countellor. He continued chief justice for 22 years, with great repute for steadiness, integrity, and thorough knowledge in his profession. Upon great occasions he asserted the law with intrepidity, though he thereby ventured to incur by

turned the indignation of both the houses of parliament. He published some Reports, and died in 1709.

formerly there was great plenty of ~~wood~~ ^{wood}. the names of towns
HOLT, a town of England, in the county of Norfolk, with a weekly market on Saturday: twenty-two miles N. W. of Norwich, and 122 N. N. E. of London.

HOLT, a town of Norway, in the diocese of Christiansand: thirty-two miles N. N. E. of Christiansand.

HOLT, a town of North Wales, in the county of Denbigh: three miles N. E. of Wrexham.

HOLT, a town of Germany, in the circle of Westphalia, and duchy of Cleves: twenty-seven miles S. E. of Cleves. Long. 24. 12 E. Ferro. Lat. 51. 39. N.

HOLY GHOST, one of the persons of the Holy Trinity. See TRINITY.

Order of the HOLY GHOST, once the principal military order in France, instituted by Henry III. in 1569. It consisted of 100 knights, who were to make proof of their nobility for three descents. The king was the grand-master or sovereign; and, as such, took an oath on his coronation-day to maintain the dignity of the order. The knights wore a golden cross, hung about their necks by a blue silk ribbon or collar. But before they received the order of the Holy-Ghost, that of St. Michael was conferred as a necessary degree; and for this reason their arms were surrounded with a double collar.

HOLYHEAD, a town and cape of the isle of Anglesea in Wales, and in the Irish channel, where people usually embark for Dublin, there being regular packet-boats that sail for that city every Monday, Wednesday, and Friday, wind and weather permitting. It is 276 miles from London, and has a very convenient harbour for the northern trade, when taken short by contrary winds. It is situated near the extremity of the Isle, and is joined to the north-west part of it by a stone bridge of one arch. It has a small market on Saturdays. The parish is about five or six miles long, and two or three broad, bounded nearly by the sea. The church stands above the harbour, within an old quadrangular fortification, with a bastion at each corner built about 450. On a mountain near it is another old fortification called Turris Munimentum, which is an old stone wall without mortar; and in its centre is a small turret, that contains a well of water. Holyhead was formerly used to be visited by Irish rovers, and was defended as a place of consequence. There are several remains of old fortifications and Druidical antiquities in its neighbourhood, as well as chapels of religious worship. The parish church of Holyhead was built in the reign of Edward III. and is in the form of a cross, with a porch and steeple very antique. There was an old chapel near the church, now converted into a school-house. A salt-house was erected on an island in the harbour in queen Anne's reign, but it is now in ruins. The town is little more than a fishing town, rendered considerable by being the place of passage to Ireland. It has three good inns. The passage hence to Ireland is in general about twelve hours. There is no fresh water here except from rain, nor any bread sold but what comes from Ireland. A bath and assembly-room were erected here in 1770. Under the mountains that overhang the town is a large cavern in the rock, supported by natural pillars, called the Parliament-house, accessible only by boats, and the tide runs into it. If this harbour was properly repaired, and ware-houses built, it would be very convenient for the Irish to import such of their goods as pay English duty, it being but a few hours sail from Dublin. Besides, the Dublin merchants might come over with the packets to see their goods landed. The commodities are, butter, cheese, bacon, wild-fowl, lobsters, crabs, oysters, razor-fish, shrimps, herrings, cod fish, whittings, whiting-pollacks, eels.

fish, sea tencies, turbot, soles, flounders, rays, and plenty of other fish. On the rocks the herb grows of which they make kelp, a fixed salt used in making glass, and in alum works. In the neighbourhood there is a large vein of white fullers which may be seen ~~24~~ ¹¹ which might be useful to fullers. often seen there; they all come in one night, ~~and~~ ⁱⁿ the same manner.

HOLY-ISLAND, a small island lying on the coast of England, 10 miles south-east of Berwick, in Northumberland. Bede calls it a *semi-island*, being, as he observes, twice an island and twice continent in one day: for at the flowing of the tide, it is encompassed by water; and at the ebb, there is an almost dry passage, both for horses and carriages, to and from the main land; from which, if measured on a straight line, it is distant about two miles eastward; but, on account of some quicksands, passengers are obliged to make so many detours that the length of way is nearly doubled. The water over these flats at spring-tides is only seven feet deep.—This island was by the Britons called *Inis Medicante*; also *Lindisfarne*, from the small rivulet of Lindi or Landi, which here runs into the sea, and the Celtic word *fabren*, or “recess;” and on account of its being the habitation of some of the first monks in this country, it afterwards obtained its present name of *Holy-island*. It measures from east to west about two miles and a quarter, and its breadth from north to south is scarcely a mile and a half. At the north-west part there runs out a spit of land of about a mile in length. The monastery is situated at the southernmost extremity; and at a small distance north of it stands the village. On this island there is plenty of fish and fowl: but the air and soil are bad. There is not a tree on the island. The village, which stands on a rising ground, consists but of a few scattered houses, chiefly inhabited by fishermen; and it has two inns. The north and east coasts are formed of perpendicular rocks, the other sides sink by gradual slopes to the sands. There is a commodious harbour, defended by a block-house; which last was surprised and taken in 1715, but was soon invested and retaken.

Holy-island, though really part of Northumberland, belongs to Durham; and all civil disputes must be determined by the justices of that county.—It was a very ancient episcopal seat. Ardan the first bishop, after presiding in it 14 years, died and was buried here A. D. 651. Finan, his successor, built a wooden church, thatched with reeds, but before the end of the century covered with lead by bishop Eadbert. St. Cuthbert, who from a poor shepherd became monk of Melrose 15 years, was prior here 12 more, when he retired to one of the barren Farn rocks, from whence he was called to this see, which he held only two years, and returned to his retirement, where he died, and was buried at the east end of his oratory, where his stone coffin is still shown. His body was found fresh 11 years after his death. Lindisfarne was ruined by the Danes, A. D. 793, when the monks carried his body about for seven years, and at last settled at Chester-le-Street, whither the see was translated, and where it continued many years. On a second destruction of the monastery by the Danes they were removing to Rippon, but stopped by a miracle at Durham, where the saint continued till the reformation, when his body was found entire, and privately buried in a wooden coffin, as some pretend, near the clock, but more probably in the ground under where his shrine stood. The entrochi found among the rocks at Lindisfarne, are called St. Cuthbert's beads, and pretended to be made by him in the night. Eighteen bishops sat here till the removal of the see to Chester, which had eight more till the removal to Durham, A. D. 995. Lindisfarne became a cell to that Benedictine monastery, valued at 48 l. *per ann.* The north and south walls

of the church are standing, much inclined; part of the west end remains, but the east is down. The columns of the nave are of four different sorts, 12 feet high and 5 feet diameter, massy and richer than those of Durham; the bases and capitals plain, supporting circular arches. ~~Over each arch are three~~ ~~in pairs, separated by a third of the body is 138 feet,~~ ~~are 11-18 feet,~~ and with the two aisles 36 feet; but it may be doubted whether there ever was a transept. One arch of the centre-tower remains adorned as is its entrance from the nave with Saxon zigzag. Somewhat to the east is the base of a cross, and to the west the present parish-church.

HOLYOAK (FRANCIS), author of a Latin dictionary, became rector of South-ham in Warwickshire in 1604; and being greatly esteemed, was chosen member of the convocation in the first year of Charles I.'s reign. He suffered much for the king; and died in 1653, aged 87. His son, Thomas Holyoak, republished the Dictionary, and made many additions to it.

HOLY-ROOD Day, a festival observed by the Roman catholics, in memory of the exaltation of our Saviour's cross. See **CROSS** and **EXALTATION**.

HOLYWELL, a town of North Wales, in the county of Flint, chiefly celebrated for a spring, called *Saint Winnifred's Well*, from whence it takes its name, and concerning which many fables have been told. It issues from the foot of a hill with great impetuosity, and turns several mills erected for working copper, making brass wire, paper, and snuff, and winding cotton, &c. At the back of the town is a hill, in which lead-ore is found. Holywell has a weekly market on Friday: fifty-two miles N. N. W. of Shrewsbury, and 212 N. W. of London.

HOLYWOOD (JOHN), or HALIFAX, or *Sacrobosco*, was, according to Leland, Bale, and Pitts, born at Halifax in Yorkshire: according to Stainhurst, at Holywood near Dublin; and according to Dempster and Mackenzie, in Nithsdale in Scotland. The last-mentioned author informs us, that, having finished his studies, he entered into orders, and was made a canon regular of the order of St. Augustine in the famous monastery of Holywood in Nithsdale. The English biographers, on the contrary, tell us, that he was educated at Oxford. They all agree, however, in asserting that he spent most of his life at Paris; where, says Mackenzie, he was admitted a member of the university on the fifth of June in the year 1221, under the syndics of the Scotch nation; and soon after elected professor of mathematics, which he taught for many years with applause. We are told by the same author, that he died in 1256, as appears from the inscription on his monument in the cloisters of the convent of St. Maturine at Paris. Holywood was certainly the first mathematician of his time. He was cotemporary with Roger Bacon, but probably older by about 20 years. He wrote, 1. *De sphaera mundi*; often reprinted, and illustrated by various commentators. 2. *De anni ratione, seu de computo ecclesiastico*. 3. *De algorismo*, printed with *Comm. Petri Cirvilli Hisp.* Paris 1498.

HOMAGE, in law, is the submission, loyalty, and service, which a tenant promised to his lord when he was first admitted to the land which he held of the lord in fee: also that owing to a king, or to any superior.

HOMBERG (WILLIAM), a celebrated physician, chemist, and philosopher, was the son of a Saxon gentleman, and born in Batavia, in the East Indies, in 1652. His father afterwards settling at Amsterdam, William there prosecuted his studies; and from thence removed to Jena, and afterwards to Leipzig, where he studied the law. In 1642 he was made advocate at Magdeburg, and there applied himself to the study of experimental philosophy. Some time after he travelled into Italy; and

applied himself to the study of medicine, anatomy, and botany, at Padua. He afterwards studied at Bologna; and at Rome learned optics, painting, sculpture, and travelled into Germany and velled into France the mines of Saxony, Bohemia, Hungary, and Sweden; and returned to France, where he acquired the esteem of the learned. He was on the point of returning into Germany, when M. Colbert being informed of his merit, made him such advantageous offers, as induced him to fix his residence at Paris. M. Homberg, who was already well known for his phosphorus, for a pneumatic machine of his own invention more perfect than that of Guericke, for his microscopes; for his discoveries in chemistry, and for the great number and variety of his curious observations, was received into the academy of sciences in 1691, and had the laboratory of that academy, of which he was one of its principal ornaments. The duke of Orleans, afterwards regent of the kingdom, at length made him his chemist, settled upon him a pension, gave him the most superb laboratory that was ever in the possession of a chemist, and in 1704 made him his first physician. He had abjured the Protestant religion in 1682, and died in 1715. There are a great number of learned and curious pieces of his writing, in the memoirs of the academy of sciences, and in several journals. He had begun to give the elements of chemistry in the memoirs of the academy, and the rest were found among his papers fit for printing.

HOMBURG, a town of Germany, in the circle of the Upper Rhine, and landgravate of Hesse. It is 60 miles N. W. of Frankfort, and subject to one of the branches of the house of Hesse.

HOMBURG, a town of Germany, in the duchy of Deux-Ponts, 50 miles S. E. of Treves. E. lon. 7. 32. N. lat. 49. 16.

HOME (HENRY), Lord KAMES, an eminent Scottish lawyer, and author of many useful and ingenious works on various subjects, was descended of an ancient family, and born in 1696, in the county of Berwick. His grandfather, Henry Home, was a younger son of Sir John Home of Renton, who held the high office of lord justice-clerk, or chief criminal judge of Scotland, in the year 1663. He received the estate of Kames from his uncle George, brother to the then lord justice-clerk. The family of Renton is descended from that of the earls of Home, the representatives of the ancient princes of Northumberland, as appears from the records of the Lion Office.

In early youth, he was lively, and eager in the acquisition of knowledge. He never attended a public school; but was instructed in the ancient and modern languages, as well as in several branches of mathematics, and the arts necessarily connected with that science, by Mr. Wingate, a man of considerable parts and learning, who spent many years as preceptor or private tutor to Mr. Home.

After studying the civil law and the municipal law of his own country at Edinburgh, Mr. Home early perceived that a knowledge of these alone is not sufficient to make an accomplished lawyer. An acquaintance with the forms and practical business of the courts, and especially of the supreme court, as a member of which he was to seek for fame and emolument, he considered as essentially necessary to qualify him to be a complete barrister. He accordingly attended for some time the chamber of a writer to the signet, where he had an opportunity of learning the styles of legal deeds, and the modes of conducting different species of business. This wise step, independently of his great genius and unwearied application, procured him, after his admission to the bar, peculiar respect from the court, and proportional employment in his profession of an advocate. Whoever peruses the law-papers composed

by Mr. Home when a young man of uncommon genius and a large knowledge of the law and constitution of his country. These qualifications, together with the strength and vivacity of his natural abilities, soon raised him to be an ornament to the Scottish bar; and, on the 2d of February 1752, he was advanced to the bench as one of the judges of the court of session, under the title of *Lord Kames*.

Before this period, however, notwithstanding the unavoidable labours of his profession, Mr. Home had become the author of several works. In 1728 he published *Remarkable Decisions of the Court of Session from 1716 to 1728*, in one vol. folio.—In 1732 appeared *Essays upon several subjects in law, viz. Jus tertii; Beneficium cedendarum actionum; Vinco Vincentem; and Prescription*; in one volume 8vo. This first produce of his original genius, and of his extensive views, excited not only the attention, but the admiration of the judges, and of all the other members of the college of justice. This work was succeeded, in the year 1741, by *Decisions of the Court of Session from its first institution to the year 1740, abridged and digested under proper heads, in form of a Dictionary*, in two volumes folio: a very laborious work, and of the greatest utility to the practical lawyer. In 1747 appeared *Essays upon several subjects concerning British Antiquities*, viz. 1. Introduction of the feudal law into Scotland. 2. Constitution of parliament. 3. Honour, Dignity. 4. Succession, or Descent; with an appendix upon hereditary and indefeasible right, composed anno 1745, and published 1747, in one volume 8vo. In a preface to this work, Lord Kames informs us, that in the years 1745 and 1746, when the nation was in great suspense and distraction, he retired to the country; and in order to banish as much as possible the uneasiness of his mind, he planned and executed these Essays.

Though not in the order of time, we shall continue the list of all our author's writings on law, before we proceed to his productions on other subjects. In 1757 he published *The Statute Law of Scotland abridged, with historical notes*, in one volume 8vo; a most useful and laborious work. In the year 1759 he presented to the public a new work under the title of *Historical Law Tracts*, in one vol. 8vo. It contains fourteen interesting tracts, viz. History of the Criminal Law:—History of Promises and Covenants:—History of Property:—History of Securities upon and for Payment of Debt:—History of the Privilege which an Heir-apparent in a feudal Holding has to continue the Possession of his Ancestor:—History of Regalities, and of the Privilege of repledging:—History of Courts:—History of Brieves:—History of Process in Absence:—History of Execution against Moveables and Land for Payment of Debt:—History of Personal Execution for Payment of Debt:—History of Execution for obtaining Payment after the Death of the Debtor:—History of the limited and universal Representation of Heirs:—Old and New Extent. In 1760 he published, in one volume folio, *The Principles of Equity*; a work which shows both the fertility of the author's genius and his indefatigable application. In 1766 he gave to the public another volume in folio of *Remarkable Decisions of the Court of Session, from 1730 to 1752*. In 1777 appeared his *Elucidations respecting the Common and Statute Law of Scotland*, in one volume 8vo. This book contains many curious and interesting remarks upon some intricate and dubious points which occur in the law of Scotland. In 1780 he published a volume, in folio, of *Select Decisions of the Court of Session from 1752 to 1768*.

Lord Kames's mind was very much inclined to metaphysical disquisitions. When a young man, in order to improve himself in his favourite study, he corresponded with the famous Berkeley bishop of Cloyne, Dr. Butler bishop of Durham, Dr.

Samuel Clark, and many other ingenious and learned men both in Britain and Ireland. The letters of correspondence, we are informed, have been carefully preserved by his son George Home-Drummond, Esq.

In the year 1751 appeared *Essays on the Principles of Morality and Natural Religion*, a small volume, but so replete with ingenuity and acute reasoning, as to give rise to much controversy. It contained, in the most explicit terms, the doctrine which then made so much noise under the appellation of *philosophical necessity*. Our author, like some other great and good men, continued a Necessarian to the day of his death; but in a subsequent edition of these essays, he exhibited a remarkable proof of his candour and liberality of sentiment, by altering certain expressions, which, contrary to his intention, had given very general offence.

In 1761 he published an *Introduction to the Art of Thinking*, in one volume 12mo. This small book consists of maxims collected from Rochefoucault and many other authors, illustrated in a variety of stories, fables, and historical anecdotes.

In the department of belles lettres, his *Elements of Criticism* appeared in 1762, in three volumes 8vo. In this valuable work our author attempts to show, that the art of criticism is founded on the principles of human nature. Such a plan, it might be thought, should have produced a dry and phlegmatic performance; but, from the sprightliness of his manner of treating every subject, he has rendered the *Elements of Criticism* not only highly instructive, but one of the most entertaining books in our language. Rollin's *Belles Lettres*, a dull performance, from which a student could derive little advantage, but which had till then been universally recommended as a standard, was wholly superseded by this popular publication.

A farther proof of the genius and various pursuits of his active mind was given in the year 1772, when Lord Kames published a work in one volume 8vo, entitled *The Gentleman Farmer, being an attempt to improve Agriculture by subjecting it to the test of rational principles*. This book met with a very favourable reception in Scotland, where, as a practical farmer, its author gave many proofs of superior skill. After he succeeded, in right of his lady, to the ample estate of Blair-Drummond in the county of Perth, he formed, and in part successfully executed, a plan for turning a large moss, consisting of at least 1500 acres, into arable land.

In 1773, Lord Kames published *Sketches of the History of Man*, in 2 vols. 4to. This work consists of a great variety of facts and observations concerning the nature of man; the produce of much and profitable reading.

His last work, intitled *Loose Hints upon Education, chiefly concerning the Culture of the Heart*, was published in 1781, in one vol. 8vo, when its venerable author was in the 85th year of his age. The intelligent reader will perceive in this composition an uncommon activity of mind at an age so far advanced beyond the usual period of human life, and an earnest desire to form the minds of youth to honour, to virtue, to industry, and to a veneration of the Deity. It must be confessed, however, that in these good intentions chiefly consists the merit of this performance, which certainly betrays some marks of that imbecility which must be expected at so extenuated a period of life.

Beside the books we have enumerated, Lord Kames published many temporary and fugitive pieces in different periodical works. In the *Essays Physical and Literary*, published by a society of gentlemen in Edinburgh, we find compositions of his Lordship *On the Laws of Motion, On the Advantages of Shallow Ploughing*, and on *Evaporation*; all of which exhibit evident marks of genius and originality of thinking.

Lord Kames was remarkable for public spirit, to which he conjoined activity and great exertion. He for a great length of

time had the principal management of all the societies and boards for promoting the trade, fisheries, and manufactures, in Scotland. As conducive to those ends, he was a strenuous advocate for making and repairing turnpike roads through every part of the country. He took likewise a chief lead in the distribution and application of the funds arising from the estates in Scotland which had unfortunately been annexed to the crown. He was no less zealous in supporting, both with his writings and personal influence, literary associations. He was in some measure the parent of what was called the *Physical and Literary Society*. This society was afterwards incorporated into the *Royal Society of Edinburgh*, which received a charter from the crown.

As a private gentleman, Lord Kames was admired by both sexes. His vivacity and wit, even when advanced in years, rendered his company not only agreeable, but greatly solicited by the literati, and esteemed by ladies of the highest rank and accomplishments. He told very few stories; and rarely, if ever, repeated the same story to the same person. From the necessity of retailing anecdotes, the miserable refuge of those who, without genius, attempt to shine in conversation, the abundance of his own mind set him free; for his wit or his learning always suggested what the occasion required. He could with equal ease and readiness combat the opinions of a metaphysician, unravel the intricacies of law, talk with a farmer on improvements in agriculture, or estimate with a lady the merits of the dress in fashion. Instead of being jealous of rivals, the characteristic of little minds, Lord Kames fostered and encouraged every symptom of merit that he could discover in the scholar, or in the lowest mechanic. Before he succeeded to the estate of Blair-Drummond, his fortune was small. Notwithstanding this circumstance, he, in conjunction with Mrs. Drummond, his respectable and accomplished spouse, did much more service to the indigent than most families of greater opulence. If the present necessity was pressing, they gave money. They did more: When they discovered that male or female petitioners were capable of performing any art or labour, both parties exerted themselves in procuring that species of work which the poor people could perform. In cases of this kind, which were very frequent, the Lady took charge of the women and his Lordship of the men. From what has been said concerning the various productions of his genius, it is obvious that there could be few idle moments in his long protracted life. His mind was incessantly employed; either teeming with new ideas, or pursuing active and laborious occupations. At the same time, with all this intellectual ardour, one great feature in the character of Lord Kames, beside his literary talents and public spirit, was a remarkable innocency of mind. He not only never indulged in detraction, but when any species of scandal was exhibited in his company, he either remained silent, or endeavoured to give a different turn to the conversation. As natural consequences of this amiable disposition, he never meddled with politics, even when parties ran to indecent lengths in this country; and, what is still more remarkable, he never wrote a sentence, notwithstanding his numerous publications, without a direct and manifest intention to benefit his fellow creatures. In his temper he was naturally warm, though kind and affectionate. In the friendships he formed, he was ardent, zealous, and sincere. So far from being inclined to irreligion, as some ignorant bigots insinuated, few men possessed a more devout habit of thought. A constant sense of Deity, and a veneration for Providence, dwelt upon his mind. From this source arose that propensity which appears in all his writings, of investigating final causes, and tracing the wisdom of the Supreme Author of nature. But here we must stop. Lord Kames, to the great regret of the public, died on the 27th day of December 1782. As he had no marked disease

but the debility necessary,

few days before his death he wearied from extreme old age, & addressed all the Judges separately, told them he was speedily to depart, and took a solemn and an affectionate farewell.

HOMER, the prince of the Greek poets, flourished, according to Dr. Blair, about 900 B. C. according to Dr. Prießley 850, according to the Arundelian marbles 300, after the taking of Troy; and agreeable to them all, above 400 years before Plato and Aristotle. Seven cities disputed the glory of having given him birth, viz. Smyrna, Rhodes, Colophon, Salamis, Chios, Argos, and Athens; which has been expressed by the following distich:

*Smyrna, Rhodes, Colophon, Salamis, Chios, Argos, Athenæ;
Orbis de patria certat, Homere, tua.*

We have nothing that is very certain in relation to the particulars of his life. The most regular account is that which goes under the name of Herodotus, and is usually printed with his history: and though it is generally supposed to be a spurious piece, yet, as it is ancient, was made use of by Strabo, and exhibits that idea which the later Greeks, and the Romans in the age of Augustus, entertained of Homer, we must content ourselves with giving an abstract of it.

A man of Magnesia, whose name was *Menalippus*, went to settle at Cumæ, where he married the daughter of a citizen called *Homyrus*, and had by her a daughter called *Critheis*. The father and mother dying, the young woman was left under the tuition of Cleonax her father's friend, and suffering herself to be deluded was got with child. The guardian, though his care had not prevented the misfortune, was however willing to conceal it; and therefore sent Critheis to Smyrna, which was then building, 18 years after the founding of Cumæ, and about 168 after the taking of Troy. Critheis being near her time, went one day to a festival, which the town of Smyrna was celebrating on the banks of the river Meles; where her pains coming upon her, she was delivered of Homer, whom she called *Meligenes*, because he was born on the banks of that river. Having nothing to maintain her, she was forced to spin: and a man of Smyrna called *Phemius*, who taught literature and music, having often seen Critheis, who lodged near him, and being pleased with her housewifery, took her into his house to spin the wool he received from his scholars for their schooling. Here she behaved herself so modestly and discreetly, that Phemius married her; and adopted her son, in whom he discovered a wonderful genius, and the best natural disposition in the world. After the death of Phemius and Critheis, Homer succeeded to his father-in-law's fortune and school; and was admired, not only by the inhabitants of Smyrna, but by strangers, who resorted from all parts to that place of trade. A shipmaster called *Mentes*, who was a man of learning and a lover of poetry, was so taken with Homer, that he persuaded him to leave his school, and to travel with him. Homer, who had then begun his poem of the Iliad, and thought it of great consequence to see the places he should have occasion to treat of, embraced the opportunity. He embarked with Mentes, and during their several voyages never failed carefully to note down all that he thought worth observing. He travelled into Egypt; from whence he brought into Greece the names of their gods, the chief ceremonies of their worship, and a more improved knowledge in the arts than what prevailed in his own country. He visited Africa and Spain; in his return from whence he touched at Ithaca, where he was much troubled with a rheum falling upon his eyes. Mentes being in haste to take a turn to Leucadia his native country, left Homer well recommended to Mentor, one of the chief men of the island of Ithaca, who took all possible care of him. There Homer was informed of many things relating to Ulysses, which he afterwards made use of in composing his *Odyssey*.

Mentes returning to Ithaca, found Homer cured. They embarked together; and after much time spent in visiting the coasts of Peloponnesus and the islands, they arrived at Colophon, where Homer was again troubled with the defluxion upon his eyes, which proved so violent, that he is said to have lost his sight. This misfortune made him resolve to return to Smyrna, where he finished his Iliad. Some time after, the ill posture of his affairs obliged him to go to Cumæ, where he hoped to have found some relief. Here his poems were highly applauded: but when he proposed to immortalize their town, if they would allow him a salary, he was answered, "that there would be no end of maintaining all the *ὄψον* or "blind men;" and hence got the name of *Homer*. He afterwards wandered through several places, and stopped at Chios, where he married, and composed his Odyssey. Some time after, having added many verses to his poems in praise of the cities of Greece, especially of Athens and Argos, he went to Samos, where he spent the winter, singing at the houses of the great men, with a train of boys after him. From Samos he went to Ios, one of the Sporades, with a design to continue his voyage to Athens; but landing by the way at Chios, he fell sick, died, and was buried on the sea-shore.

The only incontestable works which Homer has left behind him are the *ILIAD* and *ODYSSEY*. The *Batrachomyomachia*, or battle of the frogs and mice, has been disputed. The hymns have been disputed also, and attributed by the scholiasts to Cynæthus the rhapsodist: but neither Thucydides, Lucian, nor Pausanias, has scrupled to cite them as genuine. Many other pieces are ascribed to him; viz. epigrams, the *Eartiges*, the *Cecropes*, and the destruction of *Oechalia*, of which only the names are remaining.

Nothing was ever comparable to the clearness and majesty of Homer's style; to the sublimity of his thoughts; to the strength and sweetness of his verses. All his images are striking; his descriptions just and exact, the passions so well expressed, and nature so just and finely painted, that he gives to every thing motion, life, and action. But he more particularly excels in invention, and in the different characters of his heroes, which are so varied, that they affect us in an inexpressible manner. In a word, the more he is read by a person of good taste, the more he is admired. Nor are his works to be esteemed merely as entertaining poems, or as the monuments of a sublime and varied genius. He was in general so accurate with respect to costume, that he seldom mentioned persons or things that we may not conclude to have been known during the times of which he writes; and it was Mr. Pope's opinion, that his account of people, princes, and countries, was purely historical, founded on the real transactions of those times, and by far the most valuable piece of history and geography left us concerning the state of Greece in that early period. His geographical divisions of that country were thought so exact, that we are told of many controversies concerning the boundaries of Grecian cities which have been decided upon the authority of his poems.

Alcibiades gave a rhetorician a box on the ear for not having Homer's writings in his school. Alexander was ravished with them, and commonly placed them under his pillow with his sword: he inclosed the Iliad in the precious casket that belonged to Darius; "in order (said he to his courtiers) that the most perfect production of the human mind might be inclosed in the most valuable casket in the world." And one day seeing the tomb of Achilles in Sigæa, "Fortunate hero! (cried he), thou hast had a Homer to sing thy victories!" Lycurgus, Solon, and the kings and princes of Greece, set such a value on Homer's works, that they took the utmost pains in procuring correct editions of them, the most esteemed of which is that of Aristarchus. Didymus was the first who wrote notes

on Homer; and Eustathius, archbishop of Thessalonica, in the 12th century, is the most celebrated of his commentators. Mr. Pope has given an elegant translation of the Iliad, adorned with the harmony of poetic numbers; and Mad. Dacier has translated both the Iliad and Odyssey in prose.

Those who desire to know the several editions of Homer, and the writers who have employed themselves on the works of that great poet, may consult Fabricius, in the first volume of his *Bibliotheca Græca*.

A very singular discovery, however, which was made a few years ago in Russia, deserves to be here mentioned, together with the circumstances that attended it. Christian Frederic Matthæi, who had been educated by the learned Ernesti, and did credit to the instructions of that celebrated master by the great erudition he displayed, being invited to settle at Moscow, and to assist in a plan of literature for which his abilities and acquisitions eminently qualified him; on his arrival at that city was informed, equally to his astonishment and satisfaction, that a very copious treasure of Greek manuscripts was deposited in the library of the Holy Synod, which no person in that country had either the abilities to make use of, or the curiosity to examine. Struck with the relation of a circumstance so unexpected, and at the same time so peculiarly agreeable to his classical taste, he immediately seized the opportunity that was fortunately offered him, to explore this repository of hidden treasure. After having examined several curious books, he discovered a manuscript copy of the works of Homer, written about the conclusion of the 14th century, but evidently a transcript from a very ancient and most valuable copy, which, besides the Iliad and the Odyssey, contains also 16 of the hymns, which have been long published under the name of *Homer*. Nor was this all. Twelve lines of a lost hymn to Bacchus, and the hymn to Ceres, which was also lost, were preserved in this curious and long unnoticed manuscript. The hymn to Ceres appears to be entire, excepting a few lines towards the close: and it is surely remarkable, that a Greek poem, attributed to Homer, which had been lost for ages, should be at length discovered in Muscovy, the rudest and most unclassical country in Europe. M. Matthæi, exulting in an acquisition so unexpected, and at the same time so valuable, communicated it, with singular disinterestedness, to his learned friend M. Ruhnkenius, with whose talents and extraordinary erudition he was well acquainted, that this gentleman might present it to the world without those delays which would probably have retarded the publication of it at Moscow. He was rather induced to employ M. Ruhnkenius in the publication of this curious and beautiful remnant of antiquity, because he knew that this gentleman had been particularly engaged in the study of the hymns of Homer, in order to give the public a complete edition of them. The hymn to Ceres, and the fragment of the hymn to Bacchus, were printed in 1780 at Leyden, under the care of M. Ruhnkenius, who has added some very valuable notes and observations on the hymn to Ceres, which tend to illustrate its beauties, and to throw a light on some of its obscurities. The learned editor observes, that nothing was more distant from his expectations than the discovery of this hymn to Ceres. He knew indeed that a poem bearing that title, and ascribed to Homer, existed in the second century; but as it had long been considered as irretrievably lost, he had formed no hopes of ever seeing it rescued from the obscurity to which it had been consigned. He acknowledges, that he has many doubts with respect to the high and illustrious origin ascribed to this hymn: but as no positive external evidence can be produced to determine the point, he chooses to rest his argument on what appears to him the more certain ground of internal proof; and observes, that though the poem be exquisitely beautiful, yet that it is evidently deficient in some of Homer's more striking

and predominant characteristics. It wants his energy and spirit; that vigour, that inspiration, which animate and give an irresistible power, as well as an enchanting beauty, to the poems of that sublime and inimitable bard. This opinion, as we have already seen, hath been given by other critics of all the hymns of Homer. But though M. Ruhnkenius is not inclined to attribute the hymn of Ceres to Homer, he yet acknowledges, that the structure of its language is founded on the model of that great poet, and he hesitates not to give it the honour of very high antiquity. He is of opinion, that it was written immediately after Homer, or at least in the age of Hesiod: and he congratulates the age on the discovery of so curious a poem, rescued by mere accident from the darkest retreats of oblivion, and perhaps but at a slight distance from inevitable perdition. He deems it to be an acquisition, not only calculated to gratify the curiosity of the connoisseurs in classic antiquity, or to entertain those lovers of Greek poetry whose studies are made subservient to a refined and elegant species of amusement, but he also esteems it to be of particular use to the critic, as it tends to illustrate some obscure passages both in the Greek and Latin poets.

HOMER, OMER, or CHOMER, a Jewish measure, containing the tenth part of the epha. See CORUS and MEASURE.

HOMESOKEN. See HAMESECKEN.

HOMICIDE, signifies in general, the taking away of any person's life. It is of three kinds; *justifiable*, *excusable*, and *felonious*. The first has no share of guilt at all; the second very little; but the third is the highest crime against the law of nature that man is capable of committing.

I. Justifiable homicide is of different kinds.

1. Such as is owing to some unavoidable *necessity*, without any will, intention, or desire, and without any inadvertence or negligence, in the party killing, and therefore without any shadow of blame; as, for instance, by virtue of such an office as obliges one, in the execution of public justice, to put a malefactor to death, who hath forfeited his life by the laws and verdict of his country. This is an act of necessity, and even of civil duty; and therefore not only justifiable, but commendable, where the law requires it. But the law must *require* it, otherwise it is not justifiable: therefore wantonly to kill the greatest of malefactors, a felon, or a traitor, attainted or outlawed, deliberately, uncompelled, and extrajudicially, is murder. And farther, if judgment of death be given by a judge not authorized by lawful commission, and execution is done accordingly, the judge is guilty of murder. Also such judgment, when legal, must be executed by the proper officer, or his appointed deputy; for no one else is *required* by law to do it, which requisition it is that justifies the homicide. If another person doth it of his own head, it is held to be murder: even though it be the judge himself. It must farther be executed, *servato juris ordine*; it must pursue the sentence of the court. If an officer beheads one who is adjudged to be hanged, or *vice versa*, it is murder: for he is merely ministerial, and therefore only justified when he acts under the authority and compulsion of the law. But, if a sheriff changes one kind of punishment for another, he then acts by his own authority, which extends not to the commission of homicide: and besides, this licence might occasion a very gross abuse of his power. The king indeed may remit part of a sentence, as in the case of treason, all but the beheading: but this is no change, no introduction of a new punishment; and in the case of felony, where the judgment is *to be hanged*, the king (it hath been said) cannot legally order even a peer to be beheaded.

Again: In some cases homicide is justifiable, rather by the *permission*, than by the absolute *command*, of the law: either for the *advancement* of public justice, which without such indemnification would never be carried on with proper vigour;

or, in such instances where it is committed for the *prevention* of some atrocious crime, which cannot otherwise be avoided.

2. Homicides, committed for the *advancement* of public justice, are, 1. Where an officer, in the execution of his office, either in a civil or criminal case, kills a person that assaults and resists him. 2. If an officer, or any private person, attempts to take a man charged with felony, and is resisted; and, in the endeavour to take him, kills him. 3. In case of a riot, or rebellious assembly, the officers endeavouring to disperse the mob are justifiable in killing them, both at common law, and by the riot act, 1 Geo. I. c. 5. 4. Where the prisoners in a gaol, or going to gaol, assault the gaoler or officer, and he in his defence kills any of them, it is justifiable, for the sake of preventing an escape. 5. If trespassers in forests, parks, chases, or warrens, will not surrender themselves to the keepers, they may be slain; by virtue of the statute 21 Edward I. st. 2. *de malefactoribus in parcis*, and 3 & 4 W. & M. c. 10. But, in all these cases, there must be an apparent necessity on the officer's side; *viz.* that the party could not be arrested or apprehended, the riot could not be suppressed, the prisoners could not be kept in hold, the deer-stealers could not but escape, unless such homicide were committed: otherwise, without such absolute necessity, it is not justifiable. 6. If the champions in a trial by battle killed either of them the other, such homicide was justifiable, and was imputed to the just judgment of God, who was thereby presumed to have decided in favour of the truth.

3. In the next place, such homicide as is committed for the *prevention* of any forcible and atrocious crime, is justifiable by the law of nature; and also by the law of England, as it stood so early as the time of Bracton, and as it is since declared by stat. 24 H. VIII. c. 5. If any person attempts a robbery or murder of another, or attempts to break open a house *in the night-time* (which extends also to an attempt to burn it), and shall be killed in such attempt, the slayer shall be acquitted and discharged. This reaches not to any crime unaccompanied with force, as picking of pockets; or to the breaking open of any house *in the day-time*, unless it carries with it an attempt of robbery also. So the Jewish law, which punished no theft with death, makes homicide only justifiable in case of *nocturnal* house-breaking: "if a thief be found breaking up, and he be smitten that he die, no blood shall be shed for him: but if the sun be risen upon him, there shall blood be shed for him; for he should have made full restitution." At Athens, if any theft was committed by night, it was lawful to kill the criminal, if taken in the fact: and, by the Roman law of the twelve tables, a thief might be slain by night with impunity; or even by day, if he armed himself with any dangerous weapon: which amounts very nearly to the same as is permitted by our own constitution.

The Roman law also justifies homicide, when committed in defence of the chastity either of one's self or relations: and so also, according to Selden, stood the law in the Jewish republic. The English law likewise justifies a woman killing one who attempts to ravish her: and so too the husband or father may justify killing a man, who attempts a rape upon his wife or daughter; but not if he takes them in adultery by consent; for the one is forcible and felonious, but not the other. And there is no doubt but the forcibly attempting a crime, of a still more detestable nature, may be equally resisted by the death of the unnatural aggressor. For the one uniform principle that runs through our own, and all other laws, seems to be this: That where a crime, in itself capital, is endeavoured to be committed by force, it is lawful to repel that force by the death of the party attempting. But we must not carry this doctrine to the same visionary length that Mr. Locke does;

who holds, "that all manner of force without right upon a man's person, puts him in a state of war with the aggressor; and, of consequence, that, being in such a state of war, he may lawfully kill him that puts him under this unnatural restraint." However just this conclusion may be in a state of uncivilized nature, yet the law of England, like that of every other well regulated community, is too tender of the public peace, too careful of the lives of the subject, to adopt so contentious a system; nor will suffer with impunity any crime to be prevented by death, unless the same, if committed, would also be punished by death.

In these instances of *justifiable* homicide, it may be observed, that the slayer is in no kind of fault whatsoever, not even in the minutest degree: and is therefore to be totally acquitted and discharged, with commendation rather than blame. But that is not quite the case in *excusable* homicide, the very name whereof imports some fault, some error, or omission; so trivial, however, that the law excuses it from the guilt of felony, though in strictness it judges it deserving of some little degree of punishment.

II. Excusable homicide is of two sorts; either *per infortunium*, by misadventure; or *se defendendo*, upon a principle of self-preservation. We will first see wherein these two species of homicide are distinct, and then wherein they agree.

1. Homicide *per infortunium*, or misadventure, is where a man, doing a lawful act, without any intention of hurt, unfortunately kills another: as where a man is at work with a hatchet, and the head thereof flies off and kills a stander-by; or, where a person, qualified to keep a gun, is shooting at a mark, and undesignedly kills a man: for the act is lawful, and the effect is merely accidental. So where a parent is moderately correcting his child, a master his apprentice or scholar, or an officer punishing a criminal, and happens to occasion his death, it is only misadventure; for the act of correction was lawful: but if he exceeds the bounds of moderation, either in the manner, the instrument, or the quantity of punishment, and death ensues, it is manslaughter at least, and in some cases (according to the circumstances) murder; for the act of immoderate correction is unlawful. Thus, by an edict of the emperor Constantine, when the rigour of the Roman law with regard to slaves began to relax and soften, a master was allowed to chastise his slave with rods and imprisonment, and if death accidentally ensued, he was guilty of no crime: but if he struck him with a club or a stone, and thereby occasioned his death, or if in any other yet grosser manner "*immoderate suo jure utatur, tunc reus homicidii fit.*"

But to proceed. A tilt or tournament, the martial diversion of our ancestors, was however an unlawful act; and so are boxing and sword-playing, the succeeding amusements of their posterity: and therefore, if a knight in the former case, or a gladiator in the latter, be killed, such killing is felony of manslaughter. But if the king command or permit such diversion, it is said to be only misadventure; for then the act is lawful: In like manner as, by the laws both of Athens and Rome, he who killed another in the *pancratium*, or public games, authorized or permitted by the state, was not held to be guilty of homicide. Likewise to whip another's horse, whereby he runs over a child and kills him, is held to be accidental in the rider, for he has done nothing unlawful; but manslaughter in the person who whipped him, for the act was a trespass, and at best a piece of idleness, of inevitably dangerous consequence. And in general, if death ensues in consequence of an idle, dangerous, and unlawful sport, as shooting or casting stones in a town, or the barbarous diversion of cock-throwing; in these and similar cases, the slayer is guilty of manslaughter, and not misadventure only; for these are unlawful acts.

2. Homicide in *self-defence*, or *se defendendo*, upon a sudden

affray, is also excusable rather than justifiable, by the English law. This species of self-defence must be distinguished from that just now mentioned, as calculated to hinder the perpetration of a capital crime; which is not only a matter of excuse, but of justification. But the self-defence which we are now speaking of, is that whereby a man may protect himself from an assault, or the like, in the course of a sudden brawl or quarrel, by killing him who assaults him. And this is what the law expresses by the word *chance-medley*, or (as some rather choose to write it) *chaud-medley*; the former of which in its etymology signifies a *casual* affray, the latter an affray in the *heat* of blood or passion: both of them of pretty much the same import; but the former is in common speech too often erroneously applied to any manner of homicide by misadventure; whereas it appears by the statute 24 H. VIII. c. 5. and our ancient books, that it is properly applied to such killing as happens in self-defence upon a sudden rencounter. The right of natural defence does not imply a right of attacking: for, instead of attacking one another for injuries past or impending, men need only have recourse to the proper tribunals of justice. They cannot therefore legally exercise this right of preventive defence, but in sudden and violent cases; when certain and immediate suffering would be the consequence of waiting for the assistance of the law. Wherefore, to excuse homicide by the plea of self-defence, it must appear that the slayer had no other possible means of escaping from his assailant.

In some cases this species of homicide (upon *chance-medley* in self-defence) differs but little from manslaughter, which also happens frequently upon *chance-medley* in the proper legal sense of the word. But the true criterion between them seems to be this: when both parties are actually combating at the time when the mortal stroke is given, the slayer is then guilty of manslaughter; but if the slayer hath not begun to fight, or (having begun) endeavours to decline any farther struggle, and afterwards being closely pressed by his antagonist, kills him to avoid his own destruction, this is homicide excusable by self-defence. For which reason the law requires, that the person, who kills another in his own defence, should have retreated as far as he conveniently or safely can, to avoid the violence of the assault, before he turns upon his assailant; and that not fictitiously, or in order to watch his opportunity, but from a real tenderness of shedding his brother's blood. And though it may be cowardice, in time of war between two independent nations, to flee from an enemy; yet, between two fellow-subjects, the law countenances no such point of honour: because the king and his courts are the *vindices injuriarum*, and will give to the party wronged all the satisfaction he deserves. In this the civil law also agrees with ours, or perhaps goes rather farther; "*qui cum aliter tueri se non possunt, damni culpam dederint, innoxii sunt.*" The party assaulted must therefore flee as far as he conveniently can, either by reason of some wall, ditch, or other impediment; or as far as the fierceness of the assault will permit him; for it may be so fierce as not to allow him to yield a step, with manifest danger of his life, or enormous bodily harm; and then in his defence he may kill his assailant instantly. And this is the doctrine of universal justice, as well as of the municipal law.

And, as the *manner* of the defence, so is also the *time* to be considered: for if the person assaulted does not fall upon the aggressor till the affray is over, or when he is running away, this is revenge and not defence. Neither, under the colour of self-defence, will the law permit a man to screen himself from the guilt of deliberate murder: for if two persons, A and B, agree to fight a duel, and A gives the first onset, and B retreats as far as he safely can, and then kills A, this is murder; because of the previous malice and concerted design. But if A upon a sudden quarrel assaults B first, and, upon B's returning the assault, A really

and *bona fide* flies; and, being driven to the wall, turns again upon B and kills him; this may be *se defendendo*, according to some of our writers; though others have thought this opinion too favourable: inasmuch as the necessity, to which he is at last reduced, originally arose from his own fault. Under this excuse of self-defence, the principal civil and natural relations are comprehended: therefore, master and servant, parent and child, husband and wife, killing an assailant in the necessary defence of each other respectively, are excused; the act of the relation assisting being construed the same as the act of the party himself.

There is one species of homicide *se defendendo*, where the party slain is equally innocent as he who occasions his death: and yet this homicide is also excusable from the great universal principle of self-preservation, which prompts every man to save his own life preferably to that of another, where one of them must inevitably perish. As, among others, in that case mentioned by lord Bacon, where two persons, being shipwrecked, and getting on the same plank, but finding it not able to save them both, one of them thrusts the other from it, whereby he is drowned. He who thus preserves his own life at the expence of another man's, is excusable through unavoidable necessity, and the principle of self-defence; since their both remaining on the same weak plank is a mutual, though innocent, attempt upon, and endangering of, each other's life.

Let us next take a view of the circumstances wherein those two species of homicide, by misadventure and self-defence, agree; and those are in their blame and punishment. For the law sets so high a value upon the life of a man, that it always intends some misbehaviour in the person who takes it away, unless by the command or express permission of the law. In the case of misadventure, it presumes negligence, or at least a want of sufficient caution in him who was so unfortunate as to commit it; who therefore is not altogether faultless. And as to the necessity which excuses a man who kills another *se defendendo*, lord Bacon intitles it *necessitas culpabilis*, and thereby distinguishes it from the former necessity of killing a thief or a malefactor. For the law intends that the quarrel or assault arose from some unknown wrong, or some provocation, either in word or deed: and since in quarrels both parties may be, and usually are, in some fault, and it scarce can be tried who was originally in the wrong; the law will not hold the survivor entirely guiltless. But it is clear, in the other case, that where I kill a thief who breaks into my house, the original default can never be upon my side. The law besides may have a farther view, to make the crime of homicide more odious, and to caution men how they venture to kill another upon their own private judgment; by ordaining, that he who slays his neighbour, without an express warrant from the law so to do, shall in no case be absolutely free from guilt.

Nor is the law of England singular in this respect. Even the slaughter of enemies required a solemn purgation among the Jews; which implies, that the death of a man, however it happens, will leave some stain behind it. And the Mosaiical law appointed certain cities of refuge for him "who killed his neighbour unawares; as if a man goeth into the wood with his neighbour to hew wood, and his hand fetcheth a stroke with the ax to cut down a tree, and the head slippeth from the helve, and lighteth upon his neighbour that he die, he shall flee into one of those cities and live." But it seems he was not held wholly blameless, any more than in the English law; since the avenger of blood might slay him before he reached his asylum, or if he afterwards stirred out of it till the death of the high priest. In the imperial law likewise casual homicide was excused, by the indulgence of the emperor signed with his own sign-manual, "*adnotatione principis*;" otherwise, the death of a man, however committed, was in some degree punishable. Among the

Greeks, homicide by misfortune was expiated by voluntary banishment for a year. In Saxony a fine is paid to the kindred of the slain; which also, among the western Goths, was little inferior to that of voluntary homicide; and in France, no person is ever absolved in cases of this nature, without a largess to the poor, and the charge of certain masses for the soul of the party killed.

The penalty inflicted by our laws is said by Sir Edward Coke to have been anciently no less than death; which, however, is with reason denied by later and more accurate writers. It seems rather to have consisted in a forfeiture, some say of all the goods and chattels, others of only a part of them, by way of fine or *weregild*: which was probably disposed of, as in France, *in pios usus*, according to the humane superstition of the times, for the benefit of his soul who was thus suddenly sent to his account with all his imperfections on his head. But that reason having long ceased, and the penalty (especially if a total forfeiture) growing more severe than was intended, in proportion as personal property has become more considerable, the delinquent has now, and has had as early as our records will reach, a pardon and writ of restitution of his goods as a matter of course and right, only paying for suing out the same. And, indeed, to prevent this expence, in cases where the death has notoriously happened by misadventure or in self-defence, the judges will usually permit (if not direct) a general verdict of acquittal.

III. Felonious homicide is an act of a very different nature from the former, being the killing of a human creature, of any age or sex, without justification or excuse. This may be done either by killing one's self, or another man: for the consideration of which, see the articles *SELF Murder*, *MURDER*, and *MANSLAUGHTER*.

HOMILY, in ecclesiastical writers, a sermon or discourse upon some point of religion, delivered in a plain manner, so as to be easily understood by the common people. The word is Greek, *ὁμιλία*; formed of *ὁμιλεω*, *catus*, "assembly or council."

The Greek homily, says M. Fleury, signifies a familiar discourse, like the Latin *sermo*; and discourses delivered in the church took these denominations, to intimate, that they were not harangues or matters of ostentation and flourish, like those of profane orators, but familiar and useful discourses, as of a master to his disciples, or a father to his children.

All the homilies of the Greek and Latin fathers are composed by bishops. We have none of Tertullian, Clemens Alexandrinus, and many other learned persons; because, in the first ages, none but bishops were admitted to preach. The privilege was not ordinarily allowed to priests till toward the fifth century. St. Chrysostom was the first presbyter that preached stately. Origen and St. Augustine also preached; but it was by a peculiar licence or privilege.

Photius distinguishes *homily* from *sermon*; in that the homily was performed in a more familiar manner, the prelate interrogating and talking to the people, and they in their turn answering and interrogating him, so that it was properly a conversation; whereas the sermon was delivered with more form, and in the pulpit, after the manner of the orators.

The practice of compiling homilies, which were to be committed to memory, and recited by ignorant or indolent priests, commenced towards the close of the 8th century; when Charlemagne ordered Paul Deacon and Alcuin to form homilies or discourses upon the Gospels and Epistles, from the ancient doctors of the church. This gave rise to that famous collection intitled the *Homiliarium of Charlemagne*, and which being followed as a model by many productions of the same kind, composed by private persons, from a principle of pious zeal, contributed much (says Mosheim) to nourish the indolence, and to perpetuate the ignorance of a worthless clergy.

There are still extant several fine homilies, composed by the ancient fathers, particularly St. Chrysostom and St. Gregory.

Clementine HOMILIES, in ecclesiastical history, are nineteen homilies in Greek, published by Cotelierius, with two letters prefixed; one of them written in the name of Peter, the other in the name of Clement, to James bishop of Jerusalem; in which last letter they are intitled Clement's Epitome of the Preaching and Travels of Peter. According to Le Clerc, these homilies were composed by an Ebionite in the second century; but Montfaucon supposes that they were forged long after the age of St. Athanasius. Dr. Lardner apprehends, that the Clementine homilies were the original or first edition of the Recognitions; and that they are the same with the work censured by Eusebius under the title of Dialogues of Peter and Appion.

HOMINE REPLEGIANDO, a writ for the bailing of a man out of prison when he is confined without commandment of the king or his judges, or for any cause that is repleviable. But this writ is now seldom used; a writ of *babeas corpus* being sued out on the necessary occasions.

HOMMOC, a name given by mariners to a hillock or small eminence of land, resembling the figure of a cone, and appearing on the sea-coast of any country.

HOMO, MAN, is ranked by Linnæus under the order of primates; and characterised by having four parallel foreteeth both in the upper and lower jaw, and two mammæ on the breast. The species, according to this author, are two, *viz.* the homo sapiens, and the homo troglodytes.

He subdivides the homo sapiens into five varieties, *viz.* the American, the European, the Asiatic, the African, and what he calls the *monstrous*. See **MAN**.

The troglodytes, or orang-outang, is a native of Ethiopia, Java, and Amboina. His body is white; he walks erect; and is about one-half the ordinary human size. He generally lives about 25 years. He conceals himself in caves during the day, and searches for his prey in the night. He is said to be exceedingly sagacious, but is not endowed with the faculty of speech. See **TROGLODYTES**, **SIMIA**, and **COMPARATIVE ANATOMY**, page 641.

HOMOGENEOUS, or **HOMOGENEAL** (composed of the Greek *ὁμός* like, and *γενός* kind), is a term applied to various subjects, to denote that they consist of similar parts, or of parts of the same nature and kind: in contradistinction to *heterogeneous*, where the parts are of different natures, &c.

HOMOLOGATION, in the civil law, the act of confirming or rendering a thing more valid and solemn, by publication, repetition, or recognition thereof. The word comes from the Greek *ὁμολογία* "consent, assent;" formed of *ὁμός* *similis*, "like," and *λόγος*, of *λέγειν* *dicere*, "to say;" *q. d.* to say the same thing, to consent, agree.

HOMOLOGOUS, in geometry, an appellation given to the corresponding sides and angles of similar figures, as being proportional to each other.

HONAN, a province of China, bounded on the north by that of Ptecheli and Chanfi, on the west by Chanfi, on the south by Houquang, and on the east by Chantong. Every thing that can contribute to render a country delightful is found united in this province; the Chinese therefore call it *Tong-hoa*, or *the middle flower*: it is indeed situated almost in the centre of China. The ancient emperors, invited by the mildness of the climate and the beauty of the country, fixed their residence here for some time. The abundance of its fruits, pastures, and corn, the effeminacy of its inhabitants (who are accounted extremely voluptuous), and lastly, the cheapness of provisions, have no doubt prevented trade from being so flourishing here as in the other provinces of the empire. The whole country is flat, excepting towards the west, where there

arises a long chain of mountains, covered with thick forests; and the land is in such a high state of cultivation, that those who travel through it imagine they are walking in an immense garden. Besides the river Hoangho, which traverses this province, it is watered by a great number of springs and fountains; it has also a valuable lake, which invites to its banks a prodigious number of workmen, because its water has the property of communicating a lustre to silk, which cannot be imitated. Exclusive of forts, castles, and places of strength, this province contains eight *fou* or cities of the first class, and 102 of the second and third. In one of these cities named *Nanyang*, is found a kind of serpent, the skin of which is marked with small white spots: the Chinese physicians steep it in wine, and use it afterwards as an excellent remedy against the palsy.

HONAN-Fou, a city of the above province, situated amidst mountains and between three rivers. The Chinese formerly believed this city to be the centre of the earth, because it was in the middle of their empire. Its jurisdiction is very extensive; for it comprehends one city of the second class and thirteen of the third: one of these cities named *Teng-fong-bien*, is famous on account of the tower erected by the celebrated Tcheoukong for an observatory; there is still to be seen in it an instrument which he made use of to find the shadow at noon, in order to determine the latitude. This astronomer lived above a thousand years before the Christian era, and the Chinese pretend that he invented the mariner's compass.

HONDEKOOTER (MELCHIOR), a famous Dutch painter, born at Utrecht, excelled in painting animals, and especially birds. His father and grandfather were of the same profession, and their subjects the same. He was trained up to the art by his father; but surpassed not only him, but even the best of his cotemporaries in a very high degree. Till he was seventeen years of age, he continued under the direction of his father, and accustomed himself to paint several sorts of birds; but particularly he was pleased to represent cocks, hens, ducks, chickens, and peacocks, which he described in an elegant variety of actions and attitudes. After his father's death, which happened in 1653, he received some instructions from his uncle John Baptist Weenix; but his principal and best instructor was nature, which he studied with intense application. His pencil was wonderfully neat and delicate; his touch light; his colouring exceedingly natural, lively, and remarkably transparent; and the feathers of his fowls were expressed with such a swelling softness, as might readily and agreeably deceive the eye of any spectator. It is reported that he had trained up a cock to stand in any attitude he wanted to describe, and that it was his custom to place that creature near his easel; so that at the motion of his hand the bird would fix itself in the proper posture, and would continue in that particular position without the smallest perceptible alteration for several hours at a time. The landscapes which he introduces as the back grounds of his pictures, are adapted with peculiar judgment and skill, and admirably finished; they harmonize with his subject, and always increase the force and the beauty of his principal objects. His touch was very singular, in imitating the natural plumage of the fowls he painted; which not only produced a charming effect, but also may prove serviceable to an intelligent observer, to assist him in determining which are the genuine works of this master, and which are impositions. His pictures sell at a high price, and are much sought after. He died at Utrecht in 1695, aged 59.

HONDURAS, a large province of North America, bounded on the N. by the bay of the same name, on the E. by the Mosquito Shore, on the S. by Nicaragua, and on the W. by Chiapa and Guatemala. It is comprehended in the government of New Spain, although of this province, and the peninsula of

Yucatan, on the other side of the bay of Honduras, it has been observed, that anciently they can hardly be said to have formed a part of the Mexican empire. Honduras and Yucatan do not, like the other territories of Spain in the New World, derive their value either from the fertility of their soil, or the richness of their mines; but they produce, in greater abundance than any part of America, the logwood tree, which, in dyeing some colours, is so far preferable to any other material, that the consumption of it in Europe is considerable, and it is become an article in commerce of great value. During a long period, no European nation intruded upon the Spaniards in these provinces, or attempted to obtain any share in this branch of trade. But, after the conquest of Jamaica by the English, one of the first objects of the settlers on that island, was the great profit arising from the logwood trade, and the facility of wresting some portion of it from the Spaniards. Their first attempt was made at Cape Catoche, the S. E. promontory of Yucatan. When most of the trees near this cape were felled, they removed to the island of Trist, in the bay of Campeachy; and, in later times, their principal station has been in the bay of Honduras. The Spaniards, alarmed at this encroachment, endeavoured by negotiation, remonstrances, and open force, to prevent the English from obtaining any footing on that part of the American continent. But, after struggling against it for more than a century, the disasters of an unfortunate war extorted from the court of Madrid, in 1763, a reluctant consent to tolerate this settlement of foreigners in the heart of its territories. This privilege was confirmed by the definitive treaty of 1783; by which, however, it was stipulated, that nothing in this concession should be considered as derogating, in any respect, from the sovereignty of his catholic majesty; that if the English had erected any fortifications in the country, they should be demolished, and none erected in future; and that they should confine themselves within a certain district, lying between the rivers Wallis, or Bellize, and Rio Hondo, taking the course of the said two rivers for unalterable boundaries, so as that the navigation of them be common to both nations; to wit, by the river Wallis, from the sea, ascending as far as opposite to a lake, which runs into the land, and forms an isthmus, with another similar inlet, which comes from the side of Rio Nuevo, or New River; so that the line of separation pass straight across the said isthmus, and meet another lake formed by the water of Rio Nuevo, at its current; the said line to continue with the course of Rio Nuevo, descending as far as opposite to a river, which enters Rio Hondo, and thence descending by Rio Hondo to the sea. But, by a convention signed in 1786, these limits were extended; the English line, beginning from the sea, was to take the centre of the river Sibun, or Jabon, and continue up to the source of the said river; thence to cross, in a straight line, the intermediate land, till it intersected the river Wallis; and by the centre of the same river, the said line was to descend to the point where it would meet the line already settled in 1783. By this convention, moreover, the English were not only permitted to cut logwood, but mahogany, or any other kind of wood, and to carry away any other produce of the country; with certain exceptions, however, against the establishing of any plantations of sugar, coffee, &c. and they were likewise permitted, with certain restrictions, to occupy the small island called Casina, St. George's Key, or Cayo Casina. The English settlement in this country had formerly been considered as foreign; but in 1790, by an act of parliament, they were allowed the same advantages, in their exports and imports, as a British colony. The capital of Honduras is Valladolid. See MOSQUITO SHORE.

HONE, a fine kind of white stone, used for setting razors, pen-knives, and the like.

HONEY, a sweet vegetable juice, collected by the bees from the flowers of various plants, and deposited in the cells of the comb; from which it is extracted either by spontaneous percolation through a sieve in a warm place, the comb being separated and laid thereon, or by expression. That which runs spontaneously is purer than that which is expressed, a quantity of the wax and other matters being forced out along with it by the pressure. The best sort of honey is of a thick consistence, a whitish colour inclining to yellow, an agreeable smell, and pleasant taste: both the colour and flavour are said to differ in some degree, according to the plants which the bees collect it from. It is supposed that honey is merely the juice of the flower perspiring, and becoming inspissated thereon; and that the bee takes it up with its proboscis, and carries it to be deposited in its waxen cells, with which the young bees are to be fed in summer, and the old ones in winter: but it is certain, that honey can be procured by no other method of collecting this juice than by the bees. The honey wrought by the young bees, and that which is permitted to run from the comb without heat or pressure, is white and pure, and called *virgin's honey*. The honey of old bees, and that which is forced from the comb by heat or pressure, is yellow, from the wax. Honey produced where the air is clear and hot, is better than that where the air is variable and cold. The honey of Narbonne in France, where rosemary abounds, is said to have a very manifest flavour of that plant, and to be imitable by adding to other honey an infusion of rosemary flowers.

Honey, considered as a medicine, is a very useful detergent and aperient, powerfully dissolving viscid juices, and promoting the expectoration of tough phlegm. In some particular constitutions it has an inconvenience of griping, or of proving purgative; which is said to be in some measure prevented by previously boiling the honey. This, however, with all constitutions, is by no means effectual; and the circumstance mentioned has had so much weight with the Edinburgh college, that they do not now employ it in any preparation, and have entirely rejected the mella medicata, substituting syrups in their place: but there can be no doubt that honey is very useful in giving form to different articles, although there be some individuals with whom it may disagree. In order, however, to obtain the good effects of the honey itself, it must be used to a considerable extent, and as an article of diet. The following remarkable instances of the good effects of honey in some asthmatic cases given by Dr. Monro in his Medical and Pharmaceutical Chemistry, deserve to be here inserted. "The late Dr. John Hume, one of the Commissioners of the Sick and Hurt of the Royal Navy, was for many years violently afflicted with the asthma. Having taken many medicines without receiving relief, he at last resolved to try the effects of honey, having long had a great opinion of its virtues as a pectoral. For two or three years he ate some ounces of it daily, and got entirely free of his asthma, and likewise of a gravelly complaint which he had long been afflicted with. About two years after he had recovered his health, when he was sitting one day in the Office for the Sick and Hurt, a person labouring under a great difficulty of breathing, who looked as if he could not live many days, came to him, and asked him by what means he had been cured of his asthma? Dr. Hume told him the particulars of his own case, and mentioned to him the means by which he had found relief. For two years after he heard nothing of this person, who was a stranger to him, and had seemed so bad that he did not imagine that he could have lived many days, and therefore had not even asked him who he was; but at the end of that period, a man seemingly in good health, and decently dressed, came to the Sick and Hurt Office, and returned him thanks for his cure, which he assured him had been entirely brought about by the free use of honey."

HONEY-Dew, a sweet saccharine substance found on the leaves of certain trees, of which bees are very fond, by the husbandmen supposed to fall from the heavens like common dew. This opinion hath been refuted, and the true origin of this and other saccharine dews shown by the Abbe Boissier de Sauvages, in a memoir read before the Society of Sciences at Montpellier. "Chance (says the Abbe) afforded me an opportunity of seeing this juice in its primitive form on the leaves of the holm oak: these leaves were covered with thousands of small round globules or drops, which, without touching one another, seemed to point out the pore from whence each of them had proceeded. My taste informed me that they were as sweet as honey: the honey-dew on a neighbouring bramble did not resemble the former, the drops having run together; owing either to the moisture of the air which had diluted them, or to the heat which had expanded them. The dew was become more viscous, and lay in large drops, covering the leaves; in this form it is usually seen.

"The oak had at this time two sorts of leaves; the old, which were strong and firm; and the new, which were tender, and newly come forth. The honey-dew was found only on the old leaves; though these were covered by the new ones, and by that means sheltered from any moisture that could fall from above. I observed the same on the old leaves of the bramble, while the new leaves were quite free from it. Another proof that this dew proceeds from the leaves is, that other neighbouring trees not furnished with a juice of this kind had no moisture on them; and particularly the mulberry, which is a very particular circumstance, for this juice is a deadly poison to silk-worms. If this juice fell in the form of a dew, mist, or fog, it would wet all the leaves without distinction, and every part of the leaves, under as well as upper. Heat may have some share in its production: for though the common heat promotes only the transpiration of the more volatile and fluid juices, a sultry heat, especially if reflected by clouds, may so far dilate the vessel as to produce a more viscous juice, such as the honey-dew.

"The second kind of honey-dew, which is the chief resource of bees after the spring-flowers and dew by transpiration on leaves are past, owes its origin to a small insect called a *vine fretter*; the excrement ejected with some force by this insect makes a part of the most delicate honey known in nature (see *APHIS*). These vine-fretters rest during several months on the barks of particular trees, and extract their food by piercing that bark, without hurting or deforming the tree. These insects also cause the leaves of some trees to curl up, and produce galls upon others. They settle on branches that are a year old. The juice, at first perhaps hard and crabbed, becomes, in the bowels of this insect, equal in sweetness to the honey obtained from the flowers and leaves of vegetables; excepting that the flowers may communicate some of their essential oil to the honey, and this may give it a peculiar flavour, as happened to myself by planting a hedge of rosemary near my bees at Sauvages: the honey has tasted of it ever since, that shrub continuing long in flower.

"I have observed two species of vine-fretters, which live unsheltered on the bark of young branches; a larger and a lesser. The lesser species is of the colour of the bark upon which it feeds, generally green. It is chiefly distinguished by two horns, or straight, immovable, fleshy substances, which rise perpendicularly from the lower sides of the belly, one on each side. This is the species which live on the young branches of bramble and elder. The larger species is double the size of the other; is of a blackish colour; and instead of the horns which distinguish the other, have in the same part of the skin a small button, black and shining like jet.

"The buzzing of bees in a tuft of holm-oak, made me

suspect that something very interesting brought so many of them thither. I knew that it was not the season for expecting honey-dew, nor was it the place where it is usually found; and was surprised to find the tuft of leaves and branches covered with drops which the bees collected with a humming noise. The form of the drops drew my attention, and led me to the following discovery. Instead of being round like drops which had fallen, each formed a small longish oval. I soon perceived from whence they proceeded. The leaves covered with these drops of honey were situated beneath a swarm of the larger black vine-fretters; and on observing these insects, I perceived them from time to time raise their bellies, at the extremity of which there then appeared a small drop of an amber colour, which they instantly ejected from them to the distance of some inches. I found by tasting some of these drops which I had caught on my hand, that it had the same flavour with what had before fallen on the leaves. I afterwards saw the smaller species of vine-fretters eject their drops in the same manner. This ejection is so far from being a matter of indifference to these insects themselves, that it seems to have been wisely instituted to procure cleanliness in each individual, as well as to preserve the whole swarm from destruction; for pressing as they do one upon another, they would otherwise soon be glued together, and rendered incapable of stirring. The drops thus spurted out fall upon the ground, if not intercepted by leaves or branches; and the spots they make on stones remain some time, unless washed off by rain. This is the only honey-dew that falls; and this never falls from a greater height than a branch where these insects can cluster.

"It is now easy to account for a phenomenon which formerly puzzled me greatly. Walking under a lime-tree in the king's garden at Paris, I felt my hand wetted with little drops, which I at first took for small rain. The tree indeed should have sheltered me from the rain, but I escaped it by going from under the tree. A seat placed near the tree shone with these drops. And being then unacquainted with any thing of this kind, except the honey-dew found on the leaves of some particular trees, I was at a loss to conceive how so glutinous a substance could fall from the leaves in such small drops: for I knew that rain could not overcome its natural attraction to the leaves till it became pretty large drops; but I have since found, that the lime-tree is very subject to these vine-fretters.

"Bees are not the only insects that feast upon this honey; ants are equally fond of it. Led into this opinion by what naturalists have said, I at first believed that the horns in the lesser species of these vine-fretters had in their extremity a liquor which the ants went in search of: but I soon discovered that what drew the ants after them came from elsewhere, both in the larger and lesser species, and that no liquor is discharged by the horns. There are two species of ants which search for these insects. The large black ants follow those which live on the oak and chestnut; the lesser ants attend those on the elder. But as the ants are not, like the bees, provided with the means of sucking up fluids; they place themselves near the vine-fretters, in order to seize the drop the moment they see it appear upon the anus; and as the drop remains some time on the small vine-fretters before they can cast it off, the ants have leisure to catch it, and thereby prevent the bees from having any share: but the vine-fretters of the oak and chestnut being stronger, and perhaps more plentifully supplied with juice, dart the drop instantly, so that the larger ants get very little of it.

"The vine-fretters finding the greatest plenty of juice in trees about the middle of summer, afford also at that time the greatest quantity of honey; and this lessens as the season advances, so that in the autumn the bees prefer it to the flowers then in season. Though these insects pierce the tree to the sap in a thousand places, yet the trees do not seem to suffer at

all from them, nor do the leaves lose the least of their verdure. The husbandman therefore acts injudiciously when he destroys them."

HONEY *Guide*, a curious species of cuckow. See CUCULUS.

HONEY-*Locust*, or *Three-thorned Acacia*. See GLEDITSIA.

HONEY-*Suckle*. See LONICERA.

HONFLEUR, a considerable seaport of France, in the department of Calvados and late province of Normandy. It has a very capacious and safe harbour, at the mouth of the Seine: and its principal trade is in lace. It is eight miles N. of Pont l'Eveque, and 110 N. W. of Paris.

HONI SOIT QUI MAL Y PENSE, q. d. "Evil to him that thinks evil;" the motto of the most noble order of the knights of the Garter. See GARTER.

HONITON, a borough of Devonshire, with a market on Saturday. A dreadful fire happened there in July 1747, which consumed three parts of the town, and the damage was computed at 43,000*l*. It has one church, half a mile from the town, and a chapel within it. Here is a large manufactory of bonelace. Just before the entrance into the town, from London, is a hill, which commands one of the most beautiful prospects in the kingdom. Honiton is seated on the river Otter, 16 miles E. of Exeter, and 156 W. by S. of London. W. lon. 3. 12. N. lat. 50. 45.

HONORIACI, in antiquity, an order of soldiery under the eastern empire, who introduced the Goths, Vandals, Alani, Suevi, &c. into Spain. Didymus and Verinianus, two brothers, had, with great vigilance and valour, defended the passages of the Pyreneans against the Barbarians for some time, at their own expence; but being at length killed, the emperor Constantius appointed the *honoriaci* to defend those passages, who, not contented to lay them open to all the nations of the north then ravaging the Gauls, joined themselves to them.

HONOUR, a testimony of esteem or submission, expressed by words, actions, and an exterior behaviour, by which we make known the veneration and respect we entertain for any one on account of his dignity or merit. The word *honour* is also used in general for the esteem due to virtue, glory, and reputation. It is also used for *virtue* and *probity* themselves, and for an exactness in performing whatever we have promised; and in this last sense we use the term *a man of honour*. But *honour* is more particularly applied to two different kinds of virtue; bravery in men, and chastity in women.—Virtue and Honour were deified among the ancient Greeks and Romans, and had a joint temple consecrated to them at Rome: but afterwards each of them had separate temples, which were so placed, that no one could enter the temple of Honour without passing through that of Virtue; by which the Romans were continually put in mind, that virtue is the only direct path to true glory. Plutarch tells us, that the Romans, contrary to their usual custom, sacrificed to Honour uncovered; perhaps to denote, that wherever honour is, it wants no covering, but shows itself openly to the world.

The Spanish historians relate a memorable instance of honour and regard to truth. A Spanish cavalier in a sudden quarrel slew a Moorish gentleman, and fled. His pursuers soon lost sight of him, for he had unperceived thrown himself over a garden wall. The owner, a Moor, happening to be in his garden, was addressed by the Spaniard on his knees, who acquainted him with his case, and implored concealment. "Eat this," said the Moor (giving him half a peach),—"you now know that you may confide in my protection." He then locked him up in his garden apartment, telling him as soon as it was night he would provide for his escape to a place of greater safety. The Moor then went into his house, where he had but just seated himself, when a great crowd, with loud

lamentations, came to his gate, bringing the corpse of his son, who had just been killed by a Spaniard. When the first shock of surprise was a little over, he learnt from the description given, that the fatal deed was done by the very person then in his power. He mentioned this to no one; but, as soon as it was dark, retired to his garden, as if to grieve alone, giving orders that none should follow him. Then accosting the Spaniard, he said, "Christian, the person you have killed is my son, his body is now in my house. You ought to suffer; but you have eaten with me, and I have given you my faith, which must not be broken." He then led the astonished Spaniard to his stables, mounted him on one of his fleetest horses, and said, "Fly far while the night can cover you; you will be safe in the morning. You are indeed guilty of my son's blood: but God is just and good; and I thank him I am innocent of yours, and that my faith given is preserved."

This point of honour is most religiously observed by the Arabs and Saracens, from whom it was adopted by the Moors of Africa, and by them was brought into Spain. The following instance of Spanish honour may still dwell in the memory of many living, and deserves to be handed down to the latest posterity. In the year 1746, when we were in hot war with Spain, the Elizabeth of London, captain William Edwards, coming through the Gulph from Jamaica, richly laden, met with a most violent storm, in which the ship sprung a leak, that obliged them, for the saving of their lives, to run into the Havannah, a Spanish port. The captain went on shore, and directly waited on the governor, told the occasion of his putting in, and that he surrendered the ship as a prize, and himself and his men as prisoners of war, only requesting good quarter. "No, Sir," replied the Spanish governor, "if we had taken you in fair war at sea, or approaching our coast with hostile intentions, your ship would then have been a prize, and your people prisoners; but when, distressed by a tempest, you come into our ports for the safety of your lives, we, the enemies, being men, are bound as such by the laws of humanity to afford relief to distressed men who ask it of us. We cannot even against our enemies take advantage of an act of God. You have leave therefore to unload your ship, if that be necessary, to stop the leak; you may refit her here, and traffic so far as shall be necessary to pay the charges; you may then depart, and I will give you a pass to be in force till you are beyond Bermuda: if after that you are taken, you will then be a lawful prize; but now you are only a stranger, and have a stranger's right to safety and protection." The ship accordingly departed, and arrived safe in London.

A remarkable instance of the like honour is recorded of a poor unenlightened African negro, in Captain Snelgrave's account of his voyage to Guinea. A New England sloop, trading there in 1752, left a second mate, William Murray, sick on shore, and sailed without him. Murray was at the house of a black named Cudjoe, with whom he had contracted an acquaintance during their trade. He recovered; and the sloop being gone, he continued with his black friend till some other opportunity should offer of his getting home. In the meantime a Dutch ship came into the road, and some of the blacks coming on board her, were treacherously seized and carried off as their slaves. The relations and friends, transported with sudden rage, ran into the house of Cudjoe, to take revenge by killing Murray. Cudjoe stopped them at the door, and demanded what they wanted. "The white men," said they, "have carried away our brothers and sons, and we will kill all white men. Give us the white man you have in your house, for we will kill him." "Nay," said Cudjoe, "the white men that carried away your relations are bad men, kill them when you can take them; but this white man is a good man,

and you must not kill him."—"But he is a white man," they cried; "and the white men are all bad men, we will kill them all." "Nay," says he, "you must not kill a man that has done no harm, only for being white. This man is my friend, my house is his post, I am his soldier, and must fight for him; you must kill me before you can kill him. What good man will ever come again under my roof, if I let my floor be stained with a good man's blood?" The negroes seeing his resolution, and being convinced by his discourse that they were wrong, went away ashamed. In a few days Murray ventured abroad again with his friend Cudjoe, when several of them took him by the hand, and told him, "They were glad they had not killed him; for as he was a good (meaning innocent) man, their God would have been very angry, and would have spoiled their fishing."

HONOUR, in the *beau monde*, has a meaning materially different from the above, and which it is easier to illustrate than define. It is, however, subject to a system of rules, called the *law of honour*, constructed by people of fashion, calculated to facilitate their intercourse with one another, and for no other purpose. Consequently nothing is considered as inconsistent with honour, but what tends to incommode this intercourse. Hence, as Archdeacon Paley states the matter, profaneness, neglect of public worship or private devotion, cruelty to servants, rigorous treatment of tenants or other dependants, want of charity to the poor, injuries done to tradesmen by insolvency or delay of payment, with numberless examples of the same kind, are accounted no breaches of honour; because a man is not a less agreeable companion for these vices, nor the worst to deal with in those concerns which are usually transacted between one gentleman and another.—Again, the *law of honour* being constituted by men occupied in the pursuit of pleasure, and for the mutual convenience of such men, will be found, as might be expected from the character and design of the law-makers, to be, in most instances, favourable to the licentious indulgence of the natural passions. Thus it allows of fornication, adultery, drunkenness, prodigality, duelling, and revenge in the extreme; and lays no stress upon the opposite virtues.

HONOUR or *Rank*. The degrees of honour which are observed in Britain may be comprehended under these two heads, viz. *nobiles majores* and *nobiles minores*. Those included under the first rank are, archbishops, dukes, marquises, earls, viscounts, barons, and bishops; which are all distinguished by the respective ornaments of their escutcheons: and those of the last are baronets, knights, esquires, and gentlemen. There are some authors who will have baronets to be the last under the first rank; and their reason is, because their honour is hereditary, and by patent, like that of the nobility. See COMMONALTY and NOBILITY.

HONOURS of *War*, in a siege, is, when a governor, having made a long and vigorous defence, is at last obliged to surrender the place to the enemy for want of men and provisions, and makes it one of his principal articles to march out with the *honours of war*; that is, with shouldered arms, drums beating, colours flying, and all their baggage, &c.

Military HONOURS. All armies salute crowned heads in the most respectful manner, drums beating a march, colours and standards dropping, and officers saluting. Their guards pay no compliment, except to the princes of the blood; and even that by courtesy, in the absence of the crowned head. To the commander in chief the whole line turns out without arms, and the camp-guards beat a march, and salute. To generals of horse and foot, they beat a march, and salute. Lieutenant-generals of ditto, three ruffs, and salute. Major-generals of ditto, two ruffs, and salute. Brigadiers of ditto, rested arms, one ruff, and salute. Colonels of ditto, rested

arms, and no beating. Sentinels rest their arms to all field-officers, and shoulder to every officer. All governors, that are not general officers, shall, in all places where they are governors, have one ruff, with rested arms; but for those who have no commission as governors, no drum shall beat. Lieutenant-governors shall have the main-guard turned out to them with shouldered arms.

Prussian Honours of War, chiefly imitated by most powers in Europe, are, To the king, all-guards beat the march, and all officers salute. Field-marsals received with the march, and saluted in the king's absence. General of horse or foot, four ruffs; but if he commands in chief, a march and salute. Lieutenant-generals of horse or foot, commanding or not, guards beat three ruffs. Major-generals of horse and foot, two ruffs. Officers, when their guards are under arms, and a general makes a signal, must rest to him, but not beat; when not got under arms, and a signal made, only stand by their arms. Village-guards go under arms only to the king, field-marsals, generals of horse and foot, and to the general of the day. Generals' guards go under arms only to the king, field-marsals, and the general over whom they mount. Commanding officers of regiments and battalions, their own quarter and rear guards to turn out; but not to other field-officers, unless they are of the day. Generals in foreign service, the same.

HONOURS paid by *Sentinels*. Field-marsals; two sentinels with ordered fire-locks, at their tent or quarters. Generals of horse or foot; two sentinels, one with his firelock shouldered, the other ordered. Lieutenant-generals; one, with firelock ordered. Major-generals; one, with firelock shouldered. The first battalion of guards go under arms to the king only; not to stand by, nor draw up in the rear of their arms to any other; nor to give sentinels to foreigners. Second and third battalions draw up behind their arms to the princes, and to field-marsals; but when on grenadier guards or out-posts, they turn out, as other guards do, to the officers of the day. They give one sentinel with shouldered arms to the princes of the blood, and to field-marsals when they lie alone in garrison.

Court of HONOUR. See Court of CHIVALRY.

Fountain of HONOUR. The king is so styled, as being the source of honours, dignities, &c. See PREROGATIVE. Although the origin of all sovereignty is in the people, yet it is absolutely impossible that government can be maintained without a due subordination of rank. The British Constitution has therefore entrusted the king with the sole power of conferring dignities and honours, in confidence that he will bestow them only upon such as deserve them. Hence it is that all degrees of nobility, of knighthood, and other titles, are received by immediate grant from the crown: either expressed in writing, by writs or letters patent, as in the creation of peers and baronets; or by corporeal investiture, as in the creation of a simple knight.

From the same principle also arises the prerogative of erecting and disposing of offices: for honours and offices are in their nature convertible and synonymous. All offices under the crown carry in the eye of the law an honour along with them; because they imply a superiority of parts and abilities, being supposed to be always filled with those that are most able to execute them. In fact, all honours, in their original, had duties or offices annexed to them: an earl, *comes*, was the conservator or governor of a county; and a knight, *miles*, was bound to attend the king in his wars. For the same reason therefore that honours are in the disposal of the king, offices ought to be so likewise; and as the king may create new titles, so may he create new offices: but with this restriction, that he cannot create new offices with new fees annexed to them, nor annex

new fees to old offices; for this would be a tax upon the subject, which cannot be imposed but by act of parliament. Wherefore, in 13 Hen. IV. a new office being created by the king's letters patent for measuring cloths, with a new fee for the same, the letters patent were, on account of the new fee, revoked and declared void in parliament.

Upon the same or a like ground, the king has also the prerogative of conferring privileges upon private persons. Such as granting place or precedence to any of his subjects, as shall seem good to his royal wisdom: or such as converting aliens, or persons born out of the king's dominions, into denizens; whereby some very considerable privileges of natural-born subjects are conferred upon them. Such also is the prerogative of erecting corporations; whereby a number of private persons are united and knit together, and enjoy many liberties, powers, and immunities in their politic capacity, which they were utterly incapable of in their natural.

Maids of Honour, are young ladies in the queen's household, whose office is to attend the queen when she goes abroad, &c. In England they are six in number, and their salary 300 *l.* per annum each.

Honour is particularly applied in our customs to the more noble kind of feignories or lordships, whereof other inferior lordships or manors hold or depend. As a manor consists of several tenements, services, customs, &c. so an honour contains divers manors, knights-fees, &c. It was also formerly called *beneficium* or *royal fee*, being always held of the king *in capite*.

Honour-Point, in heraldry, is that next above the centre of the escutcheon, dividing the upper part into two equal portions.

Honourable, a title conferred on the younger sons of earls, the sons of viscounts and barons; as also on such persons as have the king's commission, and upon those who enjoy places of trust and honour. Members of the king's privy council are styled "Right Honourable."

Honourary, something done or conferred upon any one, to do him honour. See the article *Honour*. This is sometimes understood of a person who bears or possesses some post or title, only for the name's sake, without doing any thing of the functions belonging to it, or receiving any advantage from it: thus we say honourary counsellors, honourary fellows, &c. Honourary is also used for a lawyer's fee, or a salary given to public professors in any art or science.

Hood (*Robin*), a famous outlaw and deer-stealer, who chiefly harboured in Sherwood forest in Nottinghamshire. He was a man of family, which by his pedigree appears to have had some title to the earldom of Huntingdon; and played his pranks about the latter end of the 12th century. He was famous for archery, and for his treatment of all travellers who came in his way; levying contributions on the rich, and relieving the poor. Falling sick at last, and requiring to be blooded, he is said to have been betrayed and bled to death. He died in 1247; and was buried at Kirkstall in Yorkshire, then a Benedictine monastery, where his gravestone is still shown.

Hood. See *CHAPERON* and *COWL*.

Hood, in falconry, is a piece of leather wherewith the head of a hawk, falcon, or the like is covered.

Hood Island, one of the *Marquesas Islands*, in the South Sea. It was discovered in April 1774 by Captain Cook, which gave it that name from the person who first saw the land. It is the most northerly of the cluster, and lies in S. lat. 9. 26. W. long. 139. 13.

Hoof, the horny substance that covers the feet of some animals, as oxen, horses, &c.

Hoof-bound, in farriery. See *FARRIERY* p. 445.

Hooft (*Peter Cornelius Van*), an eminent historian and poet, born at Amsterdam in 1581. He was lord of Muiden,

judge of Goyland, and knight of the order of St. Michael. He died at the Hague in 1647. He wrote, 1. An excellent History of the Netherlands, from the abdication of Charles V. to the year 1588. 2. Several Comedies, and other works. By these he acquired such reputation, that the Flemings considered him as the Homer and Tacitus of the Netherlands.

HOOGLY, a small but ancient city of Hindoostan in Bengal. It is now nearly in ruins, but possesses many vestiges of its former greatness. In the beginning of this century, it was the great mart of the export trade of Bengal to Europe. It is seated on an arm of the Ganges, which is called the Hoogly, 26 miles N. of Calcutta. E. lon. 88. 28. N. lat. 32. 30.

HOOGLY-River, an arm of the Ganges, formed by the union of its two westernmost branches, named the Cossimbuzar and Yellinghy rivers. It is the port of Calcutta, and the only branch of the Ganges that is commonly navigated by ships.

HOOGSTRATTEN, a town of Dutch Brabant, capital of a county of the same name, 10 miles S. of Breda. E. long. 4. 41. N. lat. 51. 25.

HOOK, in angling, &c. See *FISHING-book*.

Hooks, in building, &c. are of various sorts; some of iron, and others of brass, viz. 1. Armour-hooks, which are generally of brass, and are to lay up arms upon, as guns, muskets, haltpikes, pikes, javelins, &c. 2. Casement-hooks. 3. Chimney-hooks, which are made both of brass and iron, and of different fashions: their use is to set the tongs and fire-shovel against. 4. Curtain-hooks. 5. Hooks for doors, gates, &c. 6. Double line-hooks, large and small. 7. Single line-hooks, large and small. 8. Tenter-hooks of various sorts. See *TENTER*.

Hooks of a ship, are all those forked timbers which are placed directly upon the keel, as well in her run as in her rake.

Can-Hooks, those which being made fast to the end of a rope with a noose (like that which brewers use to sling or carry their barrels on), are made use of for slings.

Foot-Hooks, in a ship, the same with *Futtocks*.

Loof-Hooks, a tackle with two hooks; one to hitch into a cringle of the main or fore-sail, in the bolt-rope at the leech of the sail by the clew; and the other is to hitch into a strap, which is spliced to the cheffs tree. Their use is to pull down the sail, and succour the tackles in a large sail and stiff gale, that all the strefs may not bear upon the tack. It is also used when the tack is to be seized more secure, and to take off or put on a bonnet or drabler.

Hook Pins, in architecture, are taper iron pins, only with a hook-head, to pin the frame of a roof or floor together.

HOOKAH, among the Arabs and other nations of the East, is a pipe of a singular and complicated construction, through which tobacco is smoked: out of a small vessel of a bell or globular form, and nearly full of water, issue two tubes, one perpendicularly, on which is placed the tobacco; the other obliquely from the side of the vessel, and to that the person who smokes applies his mouth; the smoke by this means being drawn through water, is cooled in its passage and rendered more grateful: one takes a whiff, draws up a large quantity of smoke, puffs it out of his nose and mouth in an immense cloud, and passes the hookah to his neighbour; and thus it goes round the whole circle.—The hookah is known and used throughout the East; but in those parts of it where the refinements of life prevail greatly, every one has his hookah sacred to himself; and it is frequently an implement of a very costly nature, being of silver, and set with precious stones: in the better kind, that tube which is applied to the mouth is very long and pliant; and for that reason is termed the snake: people who use it in a luxurious manner, fill the vessel through which the smoke is drawn with rose water, and it thereby receives some of the fragrant quality of that fluid. See pl. 4.

HOOKE (*Robert*), a very eminent English mathematician

and philosopher, was the son of Mr. John Hooke minister of Freshwater, in the isle of Wight, where he was born in 1635. He very early discovered a genius for mechanics, by making curious toys with great art and dexterity. He was educated under Dr. Busby in Westminster-school; where he not only acquired a competent share of Greek and Latin, together with an insight into Hebrew and some other Oriental languages, but also made himself master of a good part of Euclid's elements. About the year 1653 he went to Christ-church in Oxford, and in 1655 was introduced to the Philosophical Society there; where, discovering his mechanic genius, he was first employed to assist Dr. Willis in his operations in chemistry, and afterwards recommended to the honourable Robert Boyle, Esq. whom he served several years in the same capacity. He was also instructed in astronomy about this time by Dr. Seth Ward, Savilian professor of that science; and from henceforward distinguished himself by many noble inventions and improvements of the mechanic kind. He invented several astronomical instruments, for making observations both at sea and land; and was particularly serviceable to Mr. Boyle in completing the invention of the air-pump. Sir John Cutler having founded a mechanic school in 1664, he settled an annual stipend on Mr. Hooke for life, intrusting the president, council, and fellows, of the Royal Society to direct him with respect to the number and subject of his lectures; and on the 11th of January 1664-5, he was elected by that society curator of experiments for life, with an additional salary. In 1666 he produced to the Royal Society a model for rebuilding the city of London destroyed by fire, with which the society was well pleased; and the lord mayor and aldermen preferred it to that of the city surveyor, though it happened not to be carried into execution. It is said, by one part of this model of Mr. Hooke's, it was designed to have all the chief streets, as from Leadenhall to Newgate, and the like, to lie in exact straight lines, and all the other cross streets turning out of them at right angles, with all the churches, public buildings, markets, &c. in proper and convenient places. The rebuilding of the city according to the act of parliament requiring an able person to set out the ground to the proprietors, Mr. Hooke was appointed one of the surveyors; in which employment he got most part of his estate, as appeared pretty evident from a large iron chest of money found after his death, locked down with a key in it, and a date of the time, which showed it to have been so shut up above 30 years.—Mr. Oldenburgh, secretary to the Royal Society, dying in 1677, Mr. Hooke was appointed to supply his place, and began to take minutes at the meeting in October, but did not publish the Transactions. In the beginning of the year 1687, his brother's daughter, Mrs. Grace Hooke, who had lived with him several years, died; and he was so affected with grief at her death, that he hardly ever recovered it, but was observed from that time to become less active, more melancholy, and, if that could be, more cynical than ever. At the same time, a chancery suit in which he was concerned with Sir John Cutler, on account of his salary for reading the Cutlerian lectures, made him very uneasy, and increased his disorder. In 1691 he was employed in forming the plan of the hospital near Hoxton, founded by Robert Ask alderman of London, who appointed archbishop Tillotson one of his executors; and in December the same year, Hooke was created doctor of physic by a warrant from that prelate. In July 1696 the chancery suit with Sir John Cutler was determined in his favour, to his inexpressible satisfaction. His joy on that occasion was found in his diary thus expressed: DOMUS HUIUS; that is, *Deo, Optimo, Maximo, sit honor, laus, gloria, in secula seculorum, Amen.* "I was born on this day of July 1635, and God hath given me a new birth: may I never forget his mercies to me! while he gives me breath may I praise him!"—In the same year 1696, an order was

granted to him for repeating most of his experiments at the expence of the Royal Society, upon a promise of his finishing the accounts, observations, and deductions from them, and of perfecting the description of all the instruments contrived by him; but his increasing illness and general decay rendered him unable to perform it. He continued some years in this wasting condition; and thus languishing till he was quite emaciated, he died March 3d, 1702, at his lodgings in Gresham college, and was buried in St. Helen's church, Bishopsgate-street; his corpse being attended by all the members of the Royal Society then in London.

As to Mr. Hooke's character, it is not in all respects one of the most amiable. He made but a despicable figure as to his person, being short of stature, very crooked, pale, lean, and of a meagre aspect, with dark brown hair, very long, and hanging over his face uncut and lank. Suitable to his person, his temper was penurious, melancholy, mistrustful: and, though possessed of great philosophical knowledge, he had so much ambition, that he would be thought the only man who could invent or discover; and thus frequently laid claims to the inventions and discoveries of others, while he boasted of many of his own which he never communicated. In the religious part of his character he was so far exemplary, that he always expressed a great veneration for the Deity; and seldom received any remarkable benefit in life, or made any considerable discovery in nature, or invented any useful contrivance, or found out any difficult problem, without setting down his acknowledgment to God, as many places in his diary plainly show. He frequently studied the sacred writings in the original; for he was acquainted with the ancient languages, as well as with all parts of the mathematics.

He wrote, 1. *Lectiões Cutlerianæ.* 2. *Micrographia*, or Descriptions of minute bodies made by magnifying glasses. 3. A description of helioscopes. 4. A description of some mechanical improvements of lamps and water-poises, quarto. 5. Philosophical collections. After his death were published, 6. Posthumous work collected from his papers by Richard Waller, Secretary to the Royal Society.

HOOKER (Nathaniel), author of an esteemed Roman history and other performances. Of this learned gentleman the earliest particulars to be met with are furnished by himself, in the following modest but manly address to the Earl of Oxford, dated Oct. 7, 1722, and published in Nichols's Anecdotes of Bowyer: "My lord, the first time I had the honour to wait upon your lordship since your coming to London, your lordship had the goodness to ask me, what way of life I was then engaged in? A certain *mauvaise honte* hindered me at that time from giving a direct answer. The truth is, my lord, I cannot be said at present to be in any form of life, but rather to live extempore. The late epidemical distemper seized me, I endeavoured to be rich, imagined for a while that I was, and am in some measure happy to find myself at this instant but just worth nothing. If your lordship, or any of your numerous friends, have need of a servant, with the bare qualifications of being able to read and write, and to be honest, I shall gladly undertake any employments your lordship shall not think me unworthy of. I have been taught, my lord, that neither a man's natural pride, nor his self-love, is an equal judge of what is fit for him; and I shall endeavour to remember, that it is not the short part we act, but the manner of our performance, which gains or loses us the applause of Him who is finally to decide of all human actions. My lord, I am just now employed in translating from the French, a History of the Life of the late Archbishop of Cambrai; and I was thinking to beg the honour of your lordship's name to protect a work which will have so much need of it. The original is not yet published. 'Tis written by the author of the 'Discourse upon Epic Poetry,' in the new edition of Telemaque.

As there are some passages in the book of a particular nature, I dare not solicit your lordship to grant me the favour I have mentioned, till you first have perused it. The whole is short, and pretty fairly transcribed. If your lordship could find a spare hour to look it over, I would wait upon your lordship with it, as it may possibly be no unpleasing entertainment. I should humbly ask your lordship's pardon for so long an address in a season of so much business. But when should I be able to find a time in which your lordship's goodness is not employed? I am, with perfect respect and duty, my lord, your lordship's most obliged, most faithful, and most obedient humble servant, NATHANIEL HOOKE." The translation here spoken of was afterwards printed in 12mo, 1723. From this period till his death, Mr. Hooke enjoyed the confidence and patronage of men not less distinguished by virtue than by titles. In 17.. he published a translation of Ramsay's Travels of Cyrus, in 4to; in 1733 he revised a translation of "The History of the Conquest of Mexico by the Spaniards, by Thomas Townsend, Esq;" printed in 2 vols. 8vo; and in the same year he published, in 4to, the first volume of "The Roman History, from the building of Rome to the ruin of the Commonwealth; illustrated with maps and other plates." In the dedication to this volume, Mr. Hooke took the opportunity of "publicly testifying his just esteem for a worthy friend, to whom he had been long and much obliged," by telling Mr. Pope, that the displaying of his name at the head of those sheets was "like the hanging out a splendid sign, to catch the traveller's eye, and entice him to make trial of the entertainment the place affords. But," he proceeds, "when I can write under my sign, that Mr. Pope has been here, and was content, who will question the goodness of the house?" The volume is introduced by "Remarks on the History of the Seven Roman Kings, occasioned by Sir Isaac Newton's objections to the supposed 244 years duration of the royal state of Rome." His nervous pen was next employed in digesting "An Account of the conduct of the Dowager-duchess of Marlborough, from her first coming to Court to the year 1710, in a Letter from herself to Lord —, in 1742," 8vo. His reward on this occasion was considerable; and the reputation he acquired by the performance much greater. The circumstances of this transaction are thus related by Dr. Maty, in his Memoirs of Lord Chesterfield, vol. i. p. 116. The relic of the great duke of Marlborough, being desirous of submitting to posterity her political conduct, as well as her lord's, applied to the earl of Chesterfield for a proper person to receive her information, and put the memoirs of her life into a proper dress. Mr. Hooke was recommended by him for that purpose. He accordingly waited upon the duchess, while she was still in bed, oppressed by the infirmities of age. But, knowing who he was, she immediately got herself lifted up, and continued speaking during six hours. She delivered to him, without any notes, her account, in the most lively as well as the most connected manner. As she was not tired herself, she would have continued longer the business of this first sitting, had not she perceived that Mr. Hooke was quite exhausted, and wanted refreshment as well as rest. So eager was she for the completion of the work, that she insisted upon Mr. Hooke's not leaving her house till he had finished it. This was done in a short time; and her Grace was so well pleased with the performance, that she complimented the author with a present of 5000l. a sum which far exceeded his expectations. As soon as he was free, and permitted to quit the house of his benefactress, he hastened to the earl, to thank him for his favour, and communicated to him his good fortune. The perturbation of mind he was under, occasioned by the strong sense of his obligation, plainly appeared in his stammering out his acknowledgments: and he, who had succeeded so well as the interpreter of her Grace's sentiments, could scarcely

utter his own." The second volume of his Roman History appeared in 1745; when Mr. Hooke embraced the fair occasion of congratulating his worthy friend the earl of Marchmont, on "that true glory, the consenting praise of the honest and the wise," which his lordship had so early acquired. To the second volume Mr. Hooke added "The Capitoline Marbles, or Consular Calendars, an ancient Monument accidentally discovered at Rome in the year 1545, during the Pontificate of Paul III." In 1758 Mr. Hooke published "Observations on, I. The Answer of M. l'Abbe de Vertot to the late Earl of Stanhope's Inquiry concerning the Senate of ancient Rome: dated December 1719. II. A Dissertation upon the Constitution of the Roman Senate, by a Gentleman: published in 1743. III. A Treatise on the Roman Senate, by Dr. Conyers Middleton: published in 1747. IV. An Essay on the Roman Senate, by Dr. Thomas Chapman: published in 1750;" which he with great propriety inscribed to Mr. Speaker Onslow. The third volume of Mr. Hooke's Roman History, to the end of the Gallic war, was printed under his inspection before his last illness; but did not appear till after his death, which happened in 1764. The fourth and last volume was published in 1771. Mr. Hooke left two sons; of whom one was a divine of the church of England; the other, a doctor of the Sorbonne, and professor of astronomy in that formerly illustrious seminary.

HOOKE (JOHN), *alias* VOWELL, was born in Exeter, about the year 1524, the second son of Robert Hooker, who in 1529 was mayor of that city. He was instructed in grammar learning by Dr. Moreman, vicar of Menhinit in Cornwall, and thence removed to Oxford; but to what college is uncertain. Having left the university, he travelled to Germany, and resided some time at Cologne, where he kept exercises in law, and probably graduated. Thence he went to Strasburg, where he studied divinity under the famous Peter Martyr. He now returned to England, and soon after visited France, intending to proceed to Spain and Italy; but was prevented by a declaration of war. Returning therefore again to England, he fixed his residence in his native city, where, having married, he was in 1554 elected chamberlain, being the first person who held that office, and in 1571 represented his fellow-citizens in parliament. He died in the year 1601, and was buried in the cathedral church at Exeter. He wrote, among other works, 1. Order and usage of keeping of parliaments in Ireland. 2. The events of comets or blazing stars, made upon the sight of the comet Pagonia, which appeared in November and December 1577. 3. An addition to the chronicles of Ireland from 1546 to 1568; in the second volume of Holinshed's Chronicle. 4. A description of the city of Exeter, and of the sondrie assaults given to the same; Holinsh. Chron. vol. iii. 5. A book of ensignes. 6. Translation of the history of the conquest of Ireland from the Latin of Giraldus Cambrensis; in Holinsh. Chron. vol. ii. 7. *Synopsis chorographica*, or an historical record of the province of Devon; never printed.

HOOKE (Richard), a learned divine, was born at Heavytree, near Exeter, in the year 1553. Some of his ancestors were mayors of that city, and he was nephew to John HOOKE the historian. By this uncle he was first supported at the university of Oxford, with the addition of a small pension from Dr. Jewel, bishop of Salisbury, who in 1561 got him admitted one of the clerks of Corpus-Christi college. In 1573 he was elected scholar. In 1577 he took the degree of master of arts, and was admitted fellow the same year. In July 1579 he was appointed deputy professor of the Hebrew language. In October, in the same year, he was for some trivial misdemeanor expelled the college, but was immediately restored. In 1581 he took orders; and, being appointed to preach at St. Paul's cross, he came to London, where he was unfortunately drawn into a marriage with Joan Churchman, the termagant daugh-

ter of his hostels. Having thus lost his fellowship, he continued in the utmost distress till the year 1584, when he was presented by John Cheny, Esq. to the rectory of Drayton-Beauchamp, in Buckinghamshire. In this retirement he was visited by Mr. Edwin Sandys, and Mr. George Cranmer, his former pupils. They found him, with a Horace in his hand, tending some sheep in the common field, his servant having been ordered home by his sweet Xantippe. They attended him to his house; but were soon deprived of his company by an order from his wife Joan, for him to come and rock the cradle. Mr. Sandys's representation to his father, of his tutor's situation, procured him the mastership of the Temple. In this situation he met with considerable molestation from one Travers, lecturer of the Temple, and a bigoted Puritan, who in the afternoon endeavoured to confute the doctrine delivered in the morning. From this disagreeable situation he solicited Archbishop Whitgift to remove him to some country retirement, where he might prosecute his studies in tranquillity. Accordingly in 1591 he obtained the rectory of Boscomb in Wiltshire, together with a prebend in the church of Salisbury, of which he was also made sub-dean. In 1594 he was presented to the rectory of Bishopsbourne in Kent, where he died in the year 1600. He was buried in his own parish-church, where a monument was erected to his memory by William Cooper, Esq. He was a meek, pious, and learned divine. He wrote, 1. *Ecclesiastical Politie*, in eight books, fol. 2. A discourse of justification, &c. with two other sermons, Oxford 1612, 4to. Also several other sermons printed with the *Ecclesiastical Politie*.

HOOKER, in naval architecture, a vessel much used by the Dutch, built like a pink, but rigged and masted like a hoy. Hookers will lie nearer a wind than vessels with cross-sails can do. They are from 50 to 200 tons burden, and with a few hands will sail to the East Indies.

HOOP, a piece of pliant wood, or iron, bent into a circular form, commonly used for securing casks, &c. Driving a hoop is a boyish exercise, of good effect in rendering the limbs pliable, and for strengthening the system.

HOOPER (JOHN), bishop of Worcester, and a martyr in the Protestant cause, was born in Somersetshire, and educated at Oxford, probably in Merton-college. In 1518 he took the degree of bachelor of arts, and afterwards became a Cistercian monk; but at length, disliking his fraternity, he returned to Oxford, and there became infected with Lutheranism. In 1539 he was made chaplain and house-steward to Sir John Arundel, who afterwards suffered with the protector in the reign of Edward VI. But *that very catholic knight*, as Wood calls him, discovering his chaplain to be a heretic, Hooper was obliged to leave the kingdom. After continuing some time in France, he returned to England, and lived with a gentleman called *Seintlow*: but being again discovered, he escaped in the habit of a sailor to Ireland; thence embarked for the continent, and fixed his abode in Switzerland.—When king Edward came to the crown, Mr. Hooper returned once more to his native country. In 1550, by his old patron Sir John Arundel's interest with the earl of Warwick, he was consecrated bishop of Gloucester; and in 1552 was nominated to the see of Worcester, which he held in *commendam* with the former. But queen Mary had scarce ascended the throne, before his lordship was imprisoned, tried, and, not choosing to recant, condemned to the flames. He suffered this terrible death at Gloucester, on the 9th of February 1554, being then near 60 years of age. He was an avowed enemy to the church of Rome, and not perfectly reconciled to what he thought remnants of Popery in the church of England. In the former reign he had been one of Bonner's accusers, which sufficiently accounts for his being one of queen Mary's first sacrifices to the holy see. He was a person of good parts and learning, as may be found in Fox's Book of Martyrs.

HOOPER (George), a very learned writer, bishop of Bath and Wells, was well skilled in mathematics, and in the eastern learning and languages. He sat in those sees above 24 years, often refused a seat in the privy council, and could not be prevailed upon to accept of the bishopric of London on the death of bishop Compton. He wrote, 1. The church of England free from the imputation of Popery. 2. A discourse concerning Lent. 3. New danger of Presbytery. 4. An inquiry into the state of the ancient measures. 5. *De Valentinianorum hæresi conjecturæ*. 6. Several sermons; and other works.

HOOPING-COUGH. See MEDICINE.

HOOPOE. See UPUPA.

HOORNBECK (JOHN), professor of divinity in the universities of Leyden and Utrecht, was born at Haerlem in 1617. He understood the Latin, Hebrew, Chaldaic, Syriac, Rabbinical, Dutch, German, English, French, and Italian languages, and published many works, among which are, 1. A refutation of Socinianism, in 3 vols 4to. 2. A treatise for the conviction of the Jews. 3. Of the conversion of the Heathens. 4. Theological institutions, &c. which are written in Latin. Mr. Bayle represents him as a complete model of a good pastor and divinity professor.

HOP, in botany. See HUMULUS. Hops were first brought into England from the Netherlands in the year 1524. They are first mentioned in the English statute-book in the year 1552, viz. in the 5 and 6 of Edw. VI. cap. 5. And by an act of parliament of the first year of king James I. anno 1603, cap. 18. it appears that hops were then produced in abundance in England. The hop being a plant of great importance in this country, we shall consider what relates to the culture and management of it, under distinct heads:

Of Soil. As for the choice of soil, the hop-planters esteem the richest and strongest ground the most proper; and if it be rocky within two or three feet of the surface, the hops will prosper well; but they will by no means thrive on a stiff clay or spongy wet land.

The Kentish planters account new land best for hops; they plant their hop gardens with apple-trees at a large distance, and with cherry-trees between; and when the land hath done its best for hops, which they reckon it will in about 10 years, the trees may begin to bear. The cherry-trees last about 30 years, and by that time the apple-trees are large, they cut down the cherry-trees. The Essex planters account a moory land the most proper for hops.

As to the situation of a hop-ground, one that inclines to the south or west is the most eligible; but if it be exposed to the north-east or south-west winds, there should be a shelter of some trees at a distance, because the north-east winds are apt to nip the tender shoots in the spring; and the south-west winds frequently break and blow down the poles at the latter end of the summer, and very much endanger the hops.

In the winter-time provide your soil and manure for the hop-ground against the following spring. If the dung be rotten, mix it with two or three parts of common earth, and let it incorporate together till you have occasion to make use of it in making your hop hills; but if it be new dung, then let it be mixed as before till the spring in the next year, for new dung is very injurious to hops. Dung of all sorts was formerly more commonly made use of than it is now, especially when rotted and turned to mould, and they who have no other manure must use it; which if they do, cows or hogs dung, or human ordure mixed with mud, may be a proper compost, because hops delight most in a manure that is cool and moist.

Planting. Hops require to be planted in a situation so open as that the air may freely pass round and between them, to dry up and dissipate the moisture, whereby they will not be so subject to fire-blasts, which often destroy the middles of large plantations, while the outsidess remain unhurt.

As for the preparation of the ground for planting, it should

in the preceding winter, be ploughed and harrowed even; and then lay upon it in heaps a good quantity of fresh rich earth, or well rotted dung and earth mixed together, sufficient to put half a bushel in every hole to plant the hops in, unless the natural ground be very fresh and good.

The hills where the hops are to be planted should be eight or nine feet asunder, that the air may freely pass between them; for, in close plantations, they are very subject to what the hop-planters call the *fire blast*. If the ground is intended to be ploughed with horses between the hills, it will be best to plant them in squares chequerwise; but if the ground is so small that it may be done with the breast plough or spade, the holes should be ranged in a quincunx form. Which way soever you make use of, a stake should be stuck down at all the places where the hills are to be made.

Persons ought to be very curious in the choice of the plants as to the kind of hop; for if the hop-garden be planted with a mixture of several sorts of hops that ripen at several times, it will cause a great deal of trouble, and be a great detriment to the owner. The two best sorts are the white and the grey bind; the latter is a large square hop, more hardy, and is the more plentiful bearer, and ripens later than the former. There is another sort of the white bind, which ripens a week or ten days before the common; but this is tenderer, and a less plentiful bearer; but it has this advantage, that it comes first to market. But if three grounds, or three distant parts of one ground, be planted with these three sorts, there will be this convenience, that they may be picked successively as they become ripe. The sets should be five or six inches long; with three or more joints or buds on them.

If there be a sort of hop you value, and would increase plants and sets from, the superfluous binds may be laid down when the hops are tied, cutting off the tops, and burying them in the hill; or when the hops are dressed, all the cuttings may be saved; for almost every part will grow, and become a good set the next spring.

As to the seasons of planting hops, the Kentish planters best approve the months of October and March, both which sometimes succeed very well; but the sets are not to be had in October, unless from some ground that is to be destroyed; and likewise there is some danger that the sets may be rotted, if the winter prove very wet; therefore the most usual time of procuring them is in March, when the hops are cut and dressed.

As to the manner of planting the sets, there should be five good sets planted in every hill, one in the middle, and the rest round about sloping, the tops meeting at the centre; they must stand even with the surface of the ground; let them be pressed close with the hand, and covered with fine earth, and a stick should be placed on each side the hill to secure it.

The ground being thus planted, all that is to be done more during that summer, is to keep the hills clear from weeds, and to dig up the ground about the month of May, and to raise a small hill round about the plants. In June you must twist the young binds or branches together into a bunch or knot; for if they are tied up to small poles the first year, in order to have a few hops from them, it will not countervail the weakening of the plants.

A mixture of compost or dung being prepared for your hop-ground, the best time for laying it on, if the weather prove dry, is about Michaelmas, that the wheels of the dung-cart may not injure the hops, nor furrow the ground: if this be not done then, you must be obliged to wait till the frost has hardened the ground, so as to bear the dung-cart; and this is also the time to carry on your new poles, to recruit those that are decayed, and to be cast out every year. If you have good store of dung, the best way will be to spread it in the alleys all over the ground, and to dig it in the winter following. The quantity they will require will be 40 loads to an acre, reckoning about 30

bushels to the load. If you have not dung enough to cover all the ground in one year, you may lay it on one part one year, and on the rest in another, or a third; for there is no occasion to dung the ground after this manner oftener than once in three years. Those who have but a small quantity of dung, usually content themselves with laying on about twenty loads upon an acre every year; this they lay only on the hills, either about November, or in the spring; which last some account the best time, when the hops are dressed, to cover them after they are cut; but if it be done at this time, the compost or dung ought to be very well rotted and fine.

Dressing. As to the dressing of the hops, when the hop-ground is dug in January or February, the earth about the hills, and very near them, ought to be taken away with a spade, that you may come the more conveniently at the stock to cut it. About the end of February, if the hops were planted the spring before, or if the ground be weak, they ought to be dressed in dry weather; but else, if the ground be strong and in perfection, the middle of March will be a good time; and the latter end of March, if it be apt to produce over-rank binds, or the beginning of April may be soon enough. Then having with an iron picker cleared away all the earth out of the hills, so as to clear the stock to the principal roots, with a sharp knife you must cut off all the shoots which grew up with the binds the last year; and also all the young suckers, that none be left to run in the alley, and weaken the hill. It will be proper to cut one part of the stock lower than the other, and also to cut that part low that was left highest the preceding year. By pursuing this method you may expect to have stronger buds, and also keep the hill in good order. In dressing those hops that have been planted the year before, you ought to cut off both the dead tops and the young suckers which have sprung up from the sets, and also to cover the stocks with fine earth a finger's length in thickness.

The poling. About the middle of April the hops are to be poled, when the shoots begin to sprout up; the poles must be set to the hills deep into the ground, with a square iron picker or crow, that they may the better endure the winds; three poles are sufficient for one hill. These should be placed as near the hill as may be, with their bending tops turned outwards from the hill to prevent the binds from entangling; and a space between two poles ought to be left open to the south to admit the sun-beams.

The poles ought to be in length 16 or 20 feet, more or less according as the ground is in strength; and great care must be taken not to overpole a young or weak ground, for that will draw the stock too much, and weaken it. If a ground be overpoled, you are not to expect a good crop from it; for the branches which bear the hops will grow very little till the binds have over reached the poles, which they cannot do when the poles are too long. Two small poles are sufficient for a ground that is young.

If you wait till the sprouts or young binds are grown to the length of a foot, you will be able to make a better judgment where to place the largest poles; but if you stay till they are so long as to fall into the alleys, it will be injurious to them, because they will entangle one with another, and will not clasp about the pole readily. Maple or aspen poles are accounted the best for hops, on which they are thought to prosper best, because of their warmth; or else, because the climbing of the hop is promoted by means of the roughness of the bark. But for durability, aspen or willow poles are preferable; but chestnut poles are the most durable of all. If after the hops are grown up you find any of them have been under-poled, taller poles may be placed near those that are too short to receive the binds from them.

The tying. As to the tying of hops, the buds that do not

clasp of themselves to the nearest pole when they are grown to three or four feet high, must be guided to it by the hand, turning them to the sun, whose course they will always follow. They must be bound with withered rushes, but not so close as to hinder them from climbing up the pole. This you must continue to do till all the poles are furnished with binds, of which two or three are enough for a pole; and all the sprouts and binds that you have no occasion for, are to be plucked up; but if the ground be young, then none of these useless binds should be plucked up, but should be wrapped up together in the middle of the hill. When the binds are grown beyond the reach of your hands, if they forsake the poles, you should make use of a stand-ladder in tying them up.

Towards the latter end of May, when you have made an end of tying them, the ground must have the summer dressing: this is done by casting up with the spade some fine earth into every hill; and a month after this is done, you must hoe the alleys with a Dutch hoe, and make the hills up to a convenient bigness.

Gathering. About the middle of July hops begin to blow, and will be ready to gather about Bartholomew-tide. A judgment may be made of their ripeness by their strong scent, their hardness, and the brownish colour of their seed. When by these tokens they appear to be ripe, they must be picked with all the expedition possible; for if at this time a storm of wind should come, it would do them great damage by breaking the branches, and bruising and discolouring the hops; and it is very well known that hops, being picked green and bright, will sell for a third more than those which are discoloured and brown.

The most convenient way of picking them is into a long square frame of wood, called a *bin*, with a cloth hanging on tenter-hooks within it, to receive the hops as they are picked. The frame is composed of four pieces of wood joined together, supported by four legs, with a prop at each end to bear up another long piece of wood, placed at a convenient height over the middle of the bin; this serves to lay the poles upon, which are to be picked. This bin is commonly eight feet long, and three feet broad; two poles may be laid on it at a time, and six or eight persons may work at it, three or four on each side. It will be best to begin to pick the hops on the east or north side of your ground, if you can do it conveniently; this will prevent the south-west wind from breaking into the garden.

Having made choice of a plot of the ground containing 11 hills square, place the bin upon the hill which is in the centre, having five hills on each side; and when these hills are picked, remove the bin into another piece of ground of the same extent, and so proceed till the whole hop ground is finished. When the poles are drawn up to be picked, you must take great care not to cut the binds too near the hills, especially when the hops are green, because it will make the sap to flow excessively.

The hops must be picked very clean, *i. e.* free from leaves and stalks; and, as there shall be occasion, two or three times in a day the bin must be emptied into a hop-bag made of coarse linen cloth, and carried immediately to the oast or kiln in order to be dried; for if they should be long in the bin or bag, they will be apt to heat and be discoloured. If the weather be hot, there should no more poles be drawn than can be picked in an hour, and they should be gathered in fair weather, if it can be, and when the hops are dry; this will save some expence in firing, and preserve their colour better when they are dried.

The crop of hops being thus bestowed, you are to take care of the poles against another year, which are best to be laid up in a shed, having first stripped off the haulm from them; but if you have not that conveniency, set up three poles in the form of a triangle, or six poles (as you please) wide at bottom;

and having set them into the ground, with an iron picker, and bound them together at the top, set the rest of your poles about them; and being thus disposed, none but those on the outside will be subject to the injuries of the weather, for all the inner poles will be kept dry, unless at the top; whereas, if they were on the ground, they would receive more damage in a fortnight than by their standing all the rest of the year.

Drying. The best method of drying hops is with charcoal on an oast or kiln, covered with hair-cloth, of the same form and fashion that is used for drying malt. There is no need to give any particular directions for making these, since every carpenter or bricklayer in those countries where hops grow, or malt is made, knows how to build them. The kiln ought to be square; and may be of 10, 12, 14, or 16 feet over at the top, where the hops are laid, as your plantation requires, and your room will allow. There ought to be a due proportion between the height and breadth of the kiln and the beguets of the fiddle where the fire is kept, *viz.* if the kiln be 12 feet square on the top, it ought to be nine feet high from the fire, and the fiddle ought to be six feet and a half square, and so proportionable in other dimensions.

The hops must be spread even upon the oast a foot thick or more, if the depth of the curb will allow it; but care is to be taken not to overload the oast if the hops be green or wet. The oast ought to be first warmed with a fire before the hops are laid on, and then an even steady fire must be kept under them; it must not be too fierce at first, lest it scorch the hops, nor must it be suffered to sink or slacken, but rather be increased till the hops be nearly dried, lest the moisture or sweat which the fire has raised fall back or discolour them. When they have lain about nine hours they must be turned, and in two or three hours more they may be taken off the oast. It may be known when they are well dried by the brittleness of the stalks and the easy falling off of the hop leaves.

It is found by experience that the turning of hops, though it be after the most easy and best manner, is not only an injury or waste to the hops, but also an expence of fuel and time, because they require as much fuel and as long a time to dry a small quantity, by turning them, as a large one. Now this may be prevented by having a cover (to be let down and raised at pleasure) to the upper bed whereon the hops lie. This cover may also be tinned, by nailing single tin plates over the face of it; so that when the hops begin to dry, and are ready to burn, *i. e.* when the greatest part of their moisture is evaporated, then the cover may be let down within a foot or less of the hops (like a reverberatory), which will reflect the heat upon them, so that the top will soon be as dry as the lowermost, and every hop be equally dried.

Bagging. As soon as the hops are taken off the kiln, lay them in a room for three weeks or a month to cool, give, and toughen; for if they are bagged immediately they will powder, but if they lie a while (and the longer they lie the better, provided they be covered close with blankets to secure them from the air) they may be bagged with more safety, as not being liable to be broken to powder in treading; and this will make them bear treading the better, and the harder they are trodden the better they will keep.

The common method of bagging is as follows: they have a hole made in an upper floor, either round or square, large enough to receive a hop bag, which consists of four ells and a half of ell-wide cloth, and also contains ordinarily two hundred and a half of hops; they tie a handful of hops in each lower corner of the bag to serve as handles to it; and they fasten the mouth of the bag, so placed that the hoop may rest upon the edges of the hole. Then he that is to tread the hops down into the bag, treads the hops on every side, another person continually putting them in as he treads them till

the bag is full; which being well filled and trodden, they unrip the fastening of the bag to the hoops, and let it down, and close up the mouth of the bag, tying up a handful of hops in each corner of the mouth, as was done in the lower part.

Hops being thus packed, if they have been well dried, and laid up in a dry place, will keep good several years; but care must be taken that they be neither destroyed nor spoiled by the mice making their nests in them.

Produce. The charge of an acre of hop-ground, in most parts of England where hops are cultivated, is computed thus: Three pounds for the husbandry, four pounds for the wear of the poles, five pounds for picking and drying, one pound ten shillings for dung, one pound for rent, though in some places they pay four or five pounds an acre yearly for the rent of the land, and ten shillings for tythe; in all 15l. a year. The hop-planters in England reckon that they have but a moderate return, when the produce of an acre of hops does not sell for more than 30l. They frequently have fifty, sixty, eighty, or a hundred pounds; and in a time of general scarcity considerably more: so that, upon the whole, if the total charge of an acre of hops is computed at fifteen pounds a year, and its average produce at thirty pounds, the clear profit from an acre will be fifteen pounds a year. But the plantation of hops has lately so much increased, and the average produce so much exceeded the consumption, that hops have been with many planters rather a losing than a very profitable article.

Uses. In the spring-time, while the bud is yet tender, the tops of the plant being cut off, and boiled, are eaten like asparagus, and found very wholesome, and of service to loosen the body. The heads and tendrils are good to purify the blood in the scurvy, and most cutaneous diseases; decoctions of the flowers, and syrups thereof, are of use against pestilential fevers; juleps and apozems were formerly made with hops for hypochondriacal and hysterical affections, and to promote the menses.

A pillow stuffed with hops and laid under the head, is said to procure sleep in fevers attended with a delirium. But the principal use of hops is in the brewery, for the preservation of malt liquors; which, by the superaddition of this balsamic, aperient, and diuretic bitter, become less viscid, less apt to turn sour, more palatable, more disposed to pass off by urine, and in general more salubrious. They are said to contain an agreeable odoriferous principle, which promotes the vinous fermentation. When slightly boiled or infused in warm water, they increase its spirituality.

Laws relating to Hops. By 9 Anne, cap. 121. an additional duty of 3d. a pound is laid on all hops imported, over and above all other duties; and hops landed before entry and payment of duty, or without warrant for landing, shall be forfeited and burnt; the ship also shall be forfeited, and the person concerned in importing or landing shall forfeit 5l. a hundred weight, 7 Geo. II. cap. 19. By 9 Anne, cap. 12. there shall be paid a duty of 1d. for every pound of hops grown in Great Britain, and made fit for use, within six months after they are cured and bagged; and hop-grounds are required to be entered on pain of 40s. an acre. Places of curing and keeping are also to be entered, on pain of 50l. which may be visited by an officer at any time without obstruction, under the penalty of 20l. All hops shall, within six weeks after gathering, be brought to such places to be cured and bagged, on pain of 5s. a pound. The re-bagging of foreign hops in British bagging for sale or exportation, incurs a forfeiture of 10l. a hundred weight; and defrauding the king of his duty by using twice or oftener the same bag, with the officer's mark upon it, is liable to a penalty of 40l. The removal of hops before they have been bagged and weighed, incurs a

penalty of 50l. Concealment of hops subjects to the forfeiture of 20l. and the concealed hops; and any person who shall privately convey away any hops with intent to defraud the king and owner, shall forfeit 5s. a pound. And the duties are required to be paid within six months after curing, bagging, and weighing, on pain of double duty, two-thirds to the king, and one-third to the informer. No common brewer, &c. shall use any bitter ingredient instead of hops, on pain of 20l. Hops which have paid the duty may be exported to Ireland; but by 6 Geo. II. cap. 11. there shall be no drawback; and by 7 Geo. II. cap. 19. no foreign hops shall be landed in Ireland. Notice of bagging and weighing shall be sent in writing to the officer, on pain of 50l. 6 Geo. cap. 21. And by 14 Geo. III. cap. 68. the officer shall, on pain of 5l. weigh the bags or pockets, and mark on them the true weight or tare, the planter's name, and place of abode, and the date of the year in which such hops were grown; and the altering or forging, or obliterating such mark, incurs a forfeiture of 10l.—The owners of hops shall keep at their oasts, &c. just weights and scales, and permit the officer to use them, on pain of 20l. 6 Geo. cap. 21. And by 10 Geo. III. cap. 44. a penalty of 100l. is inflicted for false scales and weights. The owners are allowed to use casks instead of bags, under the same regulations, 6 Geo. cap. 21. If any person shall mix with hops any drug to alter the colour or scent, he shall forfeit 5l. a hundred weight. If any person shall unlawfully and maliciously cut hop-binds growing on poles in any plantation, he shall be guilty of felony without benefit of clergy. 6 Geo. II. cap. 37. By a late act, five per cent. is added to the duties on hops.

HOPE (DR. JOHN), professor of botany in the university of Edinburgh, was born at Edinburgh on the 10th of May 1725. He was the son of Mr. Robert Hope a respectable surgeon, whose father, Lord Rankeilar, made a distinguished figure as one of the senators of the college of justice in the kingdom of Scotland. By his mother he was descended from the ancient family of Glas of Sauchie in Stirlingshire. After finishing the usual course of school education, he entered at the university of Edinburgh; and having, as it were, an hereditary predilection for the healing art, his attention was soon particularly directed to that branch of science. Having finished his academical education at Edinburgh, he visited other medical schools; and upon his return to his native country, he obtained the degree of Doctor of Medicine from the university of Glasgow in the beginning of the year 1750. A few months after that, he was admitted a member of the royal college of physicians in Edinburgh, and entered upon the practice of medicine in that city. After he had continued about ten years in practice, discharging the duties of his profession with a degree of judgment, attention, and humanity, which did him great honour; by the death of Dr. Alston the botanical chair in the university became vacant; when Dr. Hope, by a commission from his sovereign, dated the 13th of April 1761, was appointed king's botanist for Scotland, and superintendant of the royal garden at Edinburgh. A few weeks after this he was elected by the town council of Edinburgh as the successor of Dr. Alston in the professorships both of botany and materia medica; and thus he became one of the members of the faculty of medicine in the university. After he had continued for about six years to give regular courses of lectures on these subjects, with no less credit to himself than benefit to his hearers, teaching the one branch during the summer, and the other during the winter months, he found that his health was considerably impaired; which induced him to form the resolution of resigning the materia medica, and of afterwards solely confining his labours as a teacher to his favourite science of botany. This resolution

he carried into effect in the year 1768; and by a new commission from his majesty, dated the 8th of May, he was nominated regius professor of medicine and botany in the university, and had the offices of king's botanist and superintendant of the royal garden conferred upon him for life, which till that time had been granted during pleasure only.

Dr. Hope's predecessor, although a learned and worthy man, could never obtain sufficient public funds for the establishment of a proper botanical garden at Edinburgh; and from the situation as well as the extent of the garden at that time, joined to the smallness of its conservatories for plants, it could boast of no riches in the way of exotics. The only field for improvement, therefore, to the botanical student, was the environs of Edinburgh, to which it must indeed be allowed that nature has been uncommonly liberal, in affording a very great variety of indigenous vegetables. In this situation, the establishment of a new garden naturally suggested itself as a grand and important object; and it was accomplished by the zeal and industry of Dr. Hope, aided by the munificence of his present majesty. The first assistance given to the undertaking was under the administration of Lord Bute; and afterwards, under that of the duke of Portland, a permanent fund for the support of the botanical garden at this place was established, which may render it not inferior to any in Europe. Dr. Hope's unwearied exertions in procuring for the garden the vegetable productions of every climate, could not be exceeded. His endeavours were constantly directed in adding not to the show, but to the riches of the garden; and they were employed with such success, that in a very short time the intelligent botanist might gratify his curiosity, in contemplating the rarest plants of every country which has yet been explored. Nor were his industrious exertions more assiduously bestowed in forming and enriching the garden, than in cherishing and promoting a zeal for botanical studies. From but a very small number of lectures, which were all that his predecessor ever gave, he gradually prolonged the course till it became as complete as any one delivered at this place; and during all this extended course, he taught in such a manner as clearly demonstrated a degree of ardour and enthusiasm in himself, which could hardly fail to inspire similar emotions in others. But even such precept, and such example, were not the only means he employed for directing the attention of the industrious, ingenious, and laudably ambitious student, to this branch of science. By bestowing, entirely at his own expence, an annual gold medal, as a testimony of superior merit, he gave a spur to exertion, from which the toils of study were alleviated by the love of fame, and the labours of industry converted into the pleasures of emulation.

Dr. Hope married the daughter of Dr. Stevenfon, an eminent physician in Edinburgh; by whom he had four sons and one daughter. He died in November 1786. He was a member not only of the Royal Society of London, but also of several foreign societies; and at the time of his death he held the distinguished office of President of the royal college of physicians.

HOPE, in ethics, is the desire of some good, attended with a belief of the possibility, at least, of obtaining it, and enlivened with joy, greater or less, according to the greater or less probability of our possessing the object of our hope. Alexander, preparing for his Asian expedition, distributed his hereditary dominions among his friends; allotting to some villages, to others boroughs, to others cities; and being asked what he had reserved for himself, replied, Hope.

HOPE, a small river of Essex, which rises near Laindon Hills, waters Stanford-le-Hope, and, entering the Thames below Mucking, gives name to a noted reach of that river.

Good-Hope. See GOOD-Hope.

HOPEA, in botany; a genus of the polyandria order, be-

longing to the polydelphia class of plants. The calyx is quinquefid, superior; the corolla pentapetalous; the stamina are many, and coalited into five pencils; there is one style; the fruit is a plum with a trilocular kernel. There is only one species, the tinctora, a native of Carolina.

HOPKINS (EZEKIEL), bishop of Derry in Ireland, was the son of an obscure clergyman in Devonshire; and was for some time a chorister of Magdalen college, Oxford, and usher of the adjoining school. He was afterwards a Presbyterian minister, and was extolled as an excellent preacher. John, lord Roberts, happening to hear him preach, was so pleased with his person, his discourse, and his manner, that he retained him as his chaplain when he was sent in quality of lord lieutenant into Ireland, and preferred him to the deanery of Raphoe; and on his being recalled, so strongly recommended him to his successor, that he was soon preferred to the bishopric at Raphoe, whence he was translated to Derry. During the war under the earl of Tyrconnel at the revolution, he withdrew into England; and was chosen minister of St. Mary, Aldermanbury, in London, where he died in 1690. His sermons, his exposition of the ten commandments, and that of the Lord's prayer, are much esteemed. His works were printed together in 1710, folio. He was the father of Mr. Charles Hopkins, several of whose poetical pieces are in Dryden's Miscellanies.

HOPLITES, HOPLITÆ, formed of ὅπλον *armour*, in antiquity, were such of the candidates at the Olympic and other sacred games as ran races in armour. One of the finest pieces of the famous Parrhasius was a painting which represented two hoplites; the one running, and seeming to sweat large drops; the other laying his arms down, as quite spent and out of breath.

HOPLITODROMOS, formed of ὅπλον *armour*, and δρεμα *I run*, in the ancient gymnastic sports, a term applied to such persons as went through those toilsome and robust exercises in complete armour; by which the exercise became much more violent, and the wearing of armour in the time of battle much more easy.

HOPLOMACHI, Ὀπλομαχοί, composed of ὅπλον *armour*, and μαχomai *I fight*, in antiquity, were a species of gladiators who fought in armour; either completely armed from head to foot, or only with a casque and cuirass.

HOPPER, a vessel wherein feed-corn is carried at the time of sowing. The word is also used for that wooden trough in a mill, into which the corn is put to be ground.

HOR, a mountain, or mountainous tract of Arabia Petraea, situated in that circuit which the Israelites took to the south and south-east of Edom in their way to the borders of Moab: on this mountain Aaron died. The inhabitants were called *Horites*. This tract was also called *Seir*, either from a native Horite, or from Esau, by way of anticipation from his hairy habit of body; whose posterity drove out the Horites.

HORÆ. See HOURS.

HORÆA, in antiquity, solemn sacrifices, consisting of fruits, &c. offered in spring, summer, autumn, and winter; that Heaven might grant mild and temperate weather. These, according to Meursius, were offered to the goddesses called Ὠραι, i. e. *Hours*, who were three in number, attended upon the Sun, presided over the four seasons of the year, and had divine worship paid them at Athens.

HORAPOLLO, or HORUS APOLLO, a grammarian of Panopolis in Egypt, according to Suidas, who first taught at Alexandria, and then at Constantinople under the reign of Theodosius. There are extant under his name, two books on the hieroglyphics of the Egyptians; which Aldus first published in Greek in 1505, in folio; and they have often been published since, with a Latin version and notes. It is

not certain, however, that the grammarian of Alexandria was the author of these books; they being rather thought to belong to another Horapollon of more ancient date: on which head, see *Fabricius's Bibliotheca Græca*.

HORATII, three Roman brothers, who, under the reign of Tullus Hostilius, fought against the three Curiatii, who belonged to the Albanian army. Two of the Horatii were first killed; but the third, by his address, successively slew the three Curiatii, and by this victory rendered the city of Alba subject to the Romans.

HORATIUS, surnamed **COELES** from his losing an eye in combat, was nephew to the consul Horatius Pulvillus, and descended from one of the three brothers who fought against the Curiatii. Porfenna, laying siege to Rome, drove the Romans from Janiculum; and pursued them to the wooden bridge over the Tiber, which joined the city to Janiculum. Largius, Herminius, and Horatius Coeles, sustained the shock of the enemy on the bridge, and prevented their entering the city with the Romans; but Largius and Herminius having passed the bridge, Horatius Coeles was left alone, and repulsed the enemy till the bridge was broken under him; he then threw himself armed into the Tiber, swam across the river, and entered Rome in triumph.

HORATIUS (Quintus Flaccus), the most excellent of the Latin poets of the lyric and satirical kind, and the most judicious critic in the reign of Augustus, was the grandson of a freedman, and was born at Venusium 64 B. C. He had the best masters in Rome, after which he completed his education at Athens. Having taken up arms, he embraced the party of Brutus and Cassius, but left his shield at the battle of Philippi. Some time after, he gave himself up entirely to the study of polite literature and poetry. His talents soon made him known to Augustus and Mæcenas, who had a particular esteem for him, and loaded him with favours. Horace also contracted a strict friendship with Agrippa, Pollio, Virgil, and all the other great men of his time. He lived without ambition, and led a tranquil and agreeable life with his friends; but was subject to a defluxion in his eyes. He died at the age of 57. There are still extant his Odes, Epistles, Satires, and Art of Poetry; of which there have been a great number of editions. The best are those of the Louvre, in 1642, folio; of Paris, 1691, quarto; of Cambridge, 1699; and that with Bentley's emendations, printed at Cambridge in 1711.

HORD, in geography, is used for a company of wandering people, which have no settled habitation, but stroll about, dwelling in waggons or under tents, to be ready to shift as soon as the herbage, fruit, and the present province is eaten bare: such are several tribes of the Tartars, particularly those who inhabit beyond the Wolga, in the kingdom of Astracan and Bulgaria. A hord consists of 50 or 60 tents, ranged in a circle, and leaving an open place in the middle. The inhabitants in each hord usually form a military company or troop, the eldest whereof is commonly the captain, and depends on the general or prince of the whole nation.

HORDEUM, **BARLEY**, in botany. See **BARLEY**.

HORDICALIA, or **HORDICIDIA**, in antiquity, a religious feast held among the Romans, wherein they sacrificed cattle big with young. This feast fell on April 15, on which day they sacrificed 30 cows with calf to the goddess Tellus or the Earth; part of them were sacrificed in the temple of Jupiter. The calves taken out of their bellies were burnt to ashes at first by the pontifices, afterwards by the eldest of the vestal virgins.

HOREB, a mountain of Asia, in Arabia Petraea, at the foot of which is a monastery, where a bishop of the Greek church resides. There are two or three fine springs, and a great number of fruit-trees.

HORESTI, a people of Britain, beyond Solway Frith (Tacitus), now *Eskdale* (Camden).

HORITES, an ancient people, who at the beginning dwelt in the mountains of Seir beyond Jordan (Gen. xiv. 6.). They had princes, and were powerful, even before Esau made a conquest of their country, (*id.* xxxvi. 20—30.). The Horites, the descendants of Seir, and the Edomites, seem afterwards to have been confounded, and to have composed but one people. (Deut. ii. 2. xxxiii. 2. and Judg. v. 4.) They dwelt in Arabia Petraea, and Arabia Deserta, to the south-east of the promised land. We find the Hebrew word חורית *Chorim*, which in the book of Genesis is translated *Horites*, to be used in an appellative sense in several other passages of scripture, and to signify nobles, or great and powerful men (1 Kings xxi. 8. 11. and Neh. ii. 16. iv. 14. v. 7. vi. 17. vii. 5. xii. 17. Eccl. x. 17. Isa. xxxiv. 12. Jer. xxvii. 20. xxxix. 6.); and it is very probable that the Greeks derived from hence their *heroes* in like manner as they derived *Anax* "a king," from the sons of Anak, the famous giant in Palestine.

HOREHOUND, **BALLOTA**, or *Stachys*, in botany. See **MARRUBIUM**.

HORIZON, in geography and astronomy, a great circle of the sphere, dividing the world into two parts or hemispheres; the one upper and visible, the other lower and hid. The word is pure Greek, ὁρίζων, which literally signifies "bounding or terminating the sight;" being formed of ὁρίζω, *termino, definio*, "I bound, I limit;" whence it is also called *finitor*, "finisher." See **ASTRONOMY** and **GEOGRAPHY**.

The horizon is either *rational* or *sensible*. 1. The *rational, true, or astronomical HORIZON*, which is also called simply and absolutely *the horizon*, is a great circle, whose plane passes through the centre of the earth, and whose poles are the zenith and nadir. It divides the sphere into two equal parts or hemispheres.

2. The *sensible, visible, or apparent HORIZON*, is a lesser circle of the sphere, which divides the visible part of the sphere from the invisible. Its poles, too, are the zenith and nadir: and consequently the *sensible horizon* is parallel to the *rational*; and it is cut at right angles, and into two equal parts, by the verticals. The *sensible horizon* is divided into *eastern* and *western*. The *eastern* or *ortive* horizon, is that part of the horizon wherein the heavenly bodies rise. The *western* or *occidial* horizon is that wherein the stars set. The altitude or elevation of any point of the sphere, is an arch of a vertical circle intercepted between it and the sensible horizon. By *sensible horizon* is also frequently meant a circle; which determines the segment of the surface of the earth, over which the eye can reach; called also the *physical horizon*. In this sense we say, a spacious *horizon*, a narrow scanty *horizon*.

HORIZONTAL, something that relates to the horizon, is taken in the horizon, or on a level with the horizon. Thus, we say, a *horizontal plane*, *horizontal line*, &c.

HORIZONTAL Dial, is that drawn on a parallel to the horizon: having its gnomon, or style, elevated according to the altitude of the pole of the place it is designed for. Horizontal dials are, of all others, the most simple and easy. See the article **DIAL**.

HORIZONTAL Line, in perspective, is a right line drawn through the principal point, parallel to the horizon: or, it is the intersection of the horizontal and perspective planes. See **PERSPECTIVE**.

HORIZONTAL Plane, is that which is parallel to the horizon of the place, or any thing inclined thereto. The business of levelling is to find whether two points be in the horizontal plane; or how much the deviation is. See **LEVELLING**.

HORIZONTAL Plane, in perspective, is a plane parallel to the

horizon, passing through the eye, and cutting the perspective plane at right angles.

HORIZONTAL Projection. See GEOGRAPHY, p. 739.

HORIZONTAL Range, of a piece of ordnance, is the distance at which it falls on or strikes the horizon, or on a horizontal plane, whatever be the angle of elevation or direction of the piece. When the piece is pointed parallel to the horizon, the range is then called the point-blank or point-blanc range.

The greatest horizontal range, in the parabolic theory, or in a vacuum, is that made with the piece elevated to 45 degrees, and is equal to double the height from which a heavy body must freely fall to acquire the velocity with which the shot is discharged. Thus, a shot being discharged with the velocity of v feet per second; because gravity generates the velocity $2g$ or $32\frac{1}{2}$ feet in the first second of time, by falling $16\frac{1}{2}$ or g feet, and because the spaces descended are as the squares of the velocities,

therefore as $4g^2 : v^2 :: g : \frac{v^2}{4g}$ the space a body must descend to acquire the velocity v of the shot or the space due

to the velocity v ; consequently the double of this, or $\frac{v^2}{2g} = \frac{v^2}{32\frac{1}{2}}$

is the greatest horizontal range with the velocity v , or at an elevation of 45 degrees; which is nearly half the square of a quarter of the velocity.

In other elevations, the horizontal range is as the sine of double the angle of elevation; so that, any other elevation being e ,

it will be, as radius 1 : sin. $2e :: \frac{v^2}{32\frac{1}{2}} : \frac{v^2}{32\frac{1}{2}} \times \sin. 2e$, the range

at the elevation e , with the velocity v .

But in a resisting medium, like the atmosphere, the actual ranges fall far short of the above theorems, in so much that with the great velocities, the actual or real ranges may be less than the 10th part of the potential ranges; so that some balls, which actually range but a mile or two, would in vacuo range 20 or 30 miles. And hence also it happens that the elevation of the piece, to shoot farthest in the resisting medium, is always below 45°, and gradually the more below it as the velocity is greater, so that the greater velocities with which balls are discharged from cannon with gunpowder, require an elevation of the gun equal to but about 30°, or even less. And the less the size of the balls is too, the less must this angle of elevation be, to shoot the farthest with a given velocity. See PROJECTILE, and GUNNERY.

HORIZONTAL Moon. See ASTRONOMY, p. 393.

HORIZONTAL Speculum. See SPECULUM.

HORMINUM, CLARY, in botany; a genus of the gymnospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 42d order, *Ferri-cillatæ*. The calyx is campanulated, with four segments nearly equal, the fourth larger, and emarginated; the upper lip of the corolla concave. There are several species; the most remarkable of which is the verbenaceum, or common wild clary. It grows naturally on sandy and gravelly ground in many parts of Britain. It has sometimes been called *oculus Christi*, from the supposed virtues of its seeds in clearing the sight, which it does by its viscous covering; for when any thing happens to fall into the eye, if one of the seeds is put in at one corner, and the eyelid kept close over it, moving the seed gently along the eye, whatever happens to be there will stick to it, and so be brought out. The virtues of this are supposed to be the same as those of the garden clary, but not quite so powerful.

HORN, in physiology, a hard substance growing on the heads of divers animals, particularly the cloven-footed quadrupeds; and serving them both as weapons of offence and defence. The horn of animals is of the same nature as their gelatinous

matter; and is only that matter charged with a less quantity of water, and a larger quantity of earth, and sufficiently condensed to have a firm and solid consistence. By digesting horn with water in Papin's digester, it may be entirely converted into jelly.

Horn is a perfectly animalised matter, and furnishes in distillation the same principles as all animal matters; that is, at first a pure phlegm, with a degree of heat not exceeding that of boiling water; then a volatile alkaline spirit, which becomes more and more penetrating and strong; a fetid, light, and thin oil; a concrete volatile salt, which forms ramifications upon the sides of the receiver; much air; fetid oil, which becomes more and more black and thick; and lastly, it leaves in the retort a considerable quantity of almost incombustible coal, from which, after its incineration, scarcely any fixed alkali can be obtained.

Animal oil, and particularly that which is drawn first in the distillation of horn, is susceptible of acquiring great thinness and volatility by repeated distillations, and is then called the *oil of dippel*. The horns of stags, and of other animals of that kind, are the most proper to furnish the animal oil to be rectified in the manner of dippel; because they yield the largest quantity. These horns also differ from the horns of other animals in this, that they contain a larger quantity of the same kind of earth which is in bones; hence they seem to possess an intermediate nature betwixt horns and bones.

Hart's-HORN. See HART'S-Horn.

HORNS make a considerable article in the arts and manufactures. Bullocks horns, softened by the fire, serve to make lanterns, combs, knives, ink-horns, tobacco-boxes, &c.

Dyeing of HORN.—Black is performed by steeping brags in aqua-fortis till it be returned green: with this the horn is to be washed once or twice, and then put into a warmed decoction of logwood and water. Green is begun by boiling it, &c. in alum-water; then with verdigrise, ammoniac, and white-wine vinegar; keeping it hot therein till sufficiently green. Red is begun by boiling it in alum-water, and finished by decoction in a liquor compounded of quicklime steeped in rain water, strained, and to every pint an ounce of Brazil-wood added. In this decoction the bone, &c. is to be boiled till sufficiently red.

Dr. Lewis informs us that horns receive a deep black stain from solution of silver. It ought to be diluted to such a degree as not sensibly to corrode the subject; and applied two or three times, if necessary, at considerable intervals, the matter being exposed as much as possible to the sun, to hasten the appearance and deepening of the colour.

Dyeing or staining HORN to imitate Tortoise-shell. The horn to be dyed must be first pressed into proper plates, scales, or other flat form; and the following mixture prepared. Take of quick-lime two parts, and of litharge one part; temper them together to the consistence of a soft paste with soap-ley. Put this paste over all the parts of the horn, except such as are proper to be left transparent, in order to give it a nearer resemblance of the tortoise-shell. The horn must remain in this manner covered with the paste till it be thoroughly dry; when, the paste being brushed off, the horn will be found partly opaque and partly transparent, in the manner of tortoise-shell; and when put over a foil, of the kind of latten called *assidue*, will be scarcely distinguishable from it. It requires some degree of fancy and judgment to dispose of the paste in such a manner as to form a variety of transparent parts, of different magnitudes and figures, to look like the effect of nature: and it will be an improvement to add semitransparent parts; which may be done by mixing whitening with some of the paste to weaken its operation in particular places; by which spots of a reddish brown will be produced, which if properly interspersed, especially on the edges of the dark parts, will greatly increase both

the beauty of the work, and its similitude with the real tortoise-shell.

HUMAN-HORNS. In Dr. Charles Leigh's natural history of Lancashire, Cheshire, and the Peak in Derbyshire, is the print of a woman with two horns on her head. When she was 28 years of age an excrescence grew upon her head like a wen, which continued 30 years, and then grew into two horns. After four years she cast them, and in their place grew two others. After four years she cast these also; and the horns which were on her head in 1668 (the time when the account was written) were then loose. Her picture, and one of her horns, are in Ashmole's museum. In the university library at Edinburgh is preserved a horn which was cut from the head of Elizabeth Love, in the 50th year of her age. It grew three inches above the ear, and was growing seven years.

HORN-Distemper, a disease incident to horned cattle, affecting the internal substance of the horn commonly called the pith, which it insensibly wastes, and leaves the horn hollow. The pith is a spongy bone, the cells of which are filled with an unctuous matter. It is furnished with a great number of small blood-vessels, is overspread with a thin membrane, and appears to be united by sutures with the bones of the head. According to an account of this distemper, published by Dr. Tostis in the Memoirs of the American Academy, vol. i. the said spongy bone is sometimes partly, and sometimes entirely, wasted. The horn loses its natural heat, and a degree of coldness is felt upon handling it. The distemper, however, is seldom suspected without a particular acquaintance with the other symptoms, which are a dulness in the countenance of the beast, a sluggishness in moving, a failure of appetite, an inclination to lie down, and, when accompanied with an inflammation of the brain, a giddiness and frequent tossing of the head. The limbs are sometimes affected with stiffness, as in a rheumatism; in cows the milk often fails, the udder is hard, and in almost all cases there is a sudden wasting of the flesh. As soon as the distemper is discovered, an opening into the diseased horn should be immediately made: which may be done with a gimlet of a moderate size, in such a part of the horn as is most favourable for the discharge. It is recommended as most prudent to bore at first two or three inches above the head. If it is found hollow, and the gimlet passes through to the opposite side, and no blood discharges from the aperture, it may be best to bore still lower, and as near the head as it shall be judged that the hollowness extends. This opening is affirmed to be a necessary measure, and often gives immediate relief. Care must be taken to keep it clear, as it is apt to be clogged by a thin fluid that gradually oozes out and fills up the passage. Some have practised sawing off the horn; but, according to the best observations, it does not succeed better than boring. From the cases Dr. Tostis has seen, he is led to conclude that injections are in general unnecessary; that, when the distemper is early discovered, no more is required than a proper opening into the horn, keeping it sufficiently clear for the admission of fresh air, the removal of the compression, and the discharge of floating matter. But when the distemper has communicated its effects to the brain, so as to produce a high degree of inflammation, it is much to be doubted whether any method of cure will succeed.

HORN is also a sort of musical instrument of the wind kind; chiefly used in hunting, to animate and bring together the dogs and the hunters. The term anciently was, *wind a horn*, all horns being in those times compassed; but since straight horns are come into use, people say *blow a horn*, and sometimes *sound a horn*. There are various lessons on a horn; as the recheat, double recheat, royal recheat, running or farewell recheat, &c. See **RECHEAT**.

The *French horn* is no other than a wreathed or contorted trumpet. It labours under the same defects as the trumpet it-

self; but these have of late been so palliated, as to require no particular selection of keys for this instrument. In the beginning of the year 1773, a foreigner, named Spandau, played in a concert at the opera-house a concerto, part whereof was in the key of C, with the minor-third; in the performance of which all the intervals seemed to be as perfect as in any wind-instrument. This improvement was effected by putting his right-hand into the bottom or bell of the instrument, and tempering the sounds by the application of his fingers to different parts of the tube. The Hebrews made use of horns, formed of rams horns, to proclaim the jubilee; whence the name **JUBILEE**.

HORN-Beam, in botany. See **CARPINUS**.

HORN-Bill, in ornithology. See **BUCCERO'S**.

HORN-Blend, is a black or green indurated bole or clay, consisting of scaly particles, which are distinguishable from those of mica, by being less shining, thicker, and rectangular. It is generally found amongst iron ores, and sometimes intermixed with mica, forming a compact stone.

HORN-Fish, *Gar-Fish*, or *Sea-Needle*. See **ESOX**.

HORN-Work, in fortification, an outwork composed of two demi-bastions joined by a curtain. See **FORTIFICATION**.

HORN, a considerable town of the United Provinces, in Friesland, with a good harbour. Here they fatten cattle that come from Denmark and Holstein. It is seated on the east side of the Zuider-Zee, 13 miles N. E. of Amsterdam.

HORN, a town of the Austrian Netherlands, capital of a county of the same name, in the bishopric of Liege. E. lon. 5. 55. N. lat. 51. 12.

Cape-HORN, the most southern part of Tierra-del-Fuego, in South America, round which all ships now pass that sail into the South Sea. W. lon. 67. 26. N. lat. 55. 58.

HORNBACH, a town of Germany, in the duchy of Deux-Ponts, seated on the river Horn, with a Benedictine abbey, five miles S. E. of Deux-Ponts. E. lon. 7. 36. N. lat. 49. 10.

HORNBERG, an ancient town of Germany, in the Black Forest, and in the duchy of Wirtemberg, with a fortress upon a mountain. It is seated on the river Gutlach, 21 miles N. E. of Friburg. E. lon. 8. 27. N. lat. 48. 12.

HORNBY, a town of Lancashire in England, seated on a branch of the river Lune, and beautified with a handsome parochial chapel. At this place a considerable manufacture of cotton is carried on. The ruins of a decayed castle are still to be seen. W. lon. 2. 20. N. lat. 54. 6.

HORNCastle, a town of Lincolnshire in England. It had a castle, as the name imports; from the architecture of which, and the Roman coins that are sometimes dug up here, it is thought to have been a camp or station of the Romans. The town is well built, and is almost surrounded with water. It is a signiory of 13 lordships. In these lordships there are several chapels for the convenience of the inhabitants, who are at too great a distance from the mother church, and pretty numerous. It has a market on Saturdays, and fairs in June and August. It is 20 miles E. of Lincoln, and 136 N. of London. W. lon. 0. 2. N. lat. 53. 14.

HORNCHURCH, a village in Essex, the only parish in the liberty of Havering. A large pair of horns is affixed to the east end of the church, for which tradition assigns a reason too idle to be repeated. It is two miles E. by S. of Rumford, of which it is the mother church, and 14 E. by N. of London.

HORNDON, a town of Essex, in England. It stands near a rivulet, that at a small distance from hence falls into the Thames, which is there called the *Hope*. The hill on which it is situated commands a beautiful prospect. It is 16 miles S. by W. of Chelmsford, 5 N. by E. of Tilbury Fort, and 19 E. of London. E. lon. 0. 35. N. lat. 51. 32.

HORNECK (**DR. ANTHONY**), a learned and pious divine, was born at Baccharach, in the lower Palatinate, in 1641. He

Studied divinity under Dr. Spanheim at Heidelberg; and afterwards coming to England, completed his studies at Oxford, and became vicar of Allhallows in that city. In 1665 he removed into the family of the duke of Albemarle; and was tutor to his grace's son, then lord Torrington. The duke presented him to the rectory of Doulton in Devonshire, and procured for him a prebend in Exeter. He was afterwards chosen preacher of the Savoy. In 1693 he was collated to a prebend in Westminster, and the same year admitted to a prebend in the cathedral of Wells. He published, 1. *The Great Law of Consideration.* 2. *The Happy Affectick.* 3. *Delight and Judgment.* 4. *The Fire of the Altar.* 5. *The Exercise of Prayer.* 6. *The Crucified Jesus.* 7. Several sermons and other works. He died in 1696, and was interred in Westminster-abbey, where a monument is erected to his memory.

HORNERS, those people whose business it is to prepare various utensils of the horns of cattle. The horners were a very ancient and considerable fraternity in the city of London some hundred years ago. In the reign of Edward II. they complained to parliament, that by foreigners buying up the horns in England, they were in danger of being ruined, and this business lost to the nation. For this reason was made the statute 6 Edw. IV. by which the sale of horns to foreigners (except such as the said horners refused) was prohibited; and the wardens had power granted them to search all the markets in London and 24 miles round, and to inspect Stourbridge and Ely fairs, to prevent such practices, and to purchase horns at stated prices. But on plausible pretences this law was repealed in the reign of James I. and thereupon the old evil revived. The horners again applied to parliament, and king Edward's statute was renewed (excepting as to the inspection of the fairs), and still remains in force. The importation of unwrought horns into this country is also prohibited. In 1750 there were exported to Holland 514,500 lantern leaves, besides powder flasks. There was formerly a duty of 20 shillings a thousand, under which in 1682 were exported 76,650; but in the reign of George I. this duty was taken off, and these and all other manufactures made of horns may be exported free. The present company of horners were incorporated January 12, 1638; and consist of a master, two wardens, and nine assistants, without livery or hall. They have a warehouse in Spitalfields, to which the horns are sent as brought from town and country markets, and thence regularly divided, the widows and orphans of deceased members having equal shares.

HORNET, in zoology, a species of wasp. See **VESPA**.

HORNIUS (**GEORGE**), professor of history at Leyden, was born in the Palatinate, and died at Leyden in 1670. He was a little maniacal towards the end of his life; which disorder was supposed to be occasioned by the loss of 6000 florins he had entrusted with an alchemist at the Hague. His works are, 1. *Historia Ecclesiastica ad ann. 1666.* This has been well esteemed. 2. *De Originibus Americanis*, 1652, 8vo. 3. *Geographia Vetust & Nova.* 4. *Orbis Politicus.* He was a man of deep reading rather than great parts.

HORNSEA, a town in Yorkshire, 188 miles from London. It is almost surrounded by a small arm of the sea; and the church having a high steeple, is a noted sea-mark. Not many years ago there was a street here called *Hornsea-beck*, which was washed away by the sea, except a house or two. E. lon. o. 6. N. lat. 54. o.

HORNSEY, a town of Middlesex, five miles north of London. It is a long straggling place, situated in a low valley, but extremely pleasant, having the new river winding through it. Its church, of which Highgate is a hamlet, is supposed to be built with the stones that came from Lodge-hill, the bishop of London's hunting seat in his park here; it having been his manor from the most ancient times. About a mile nearer this is

a coppice of young trees, called *Hornsey-wood*, at the entrance of which is a public-house, to which great numbers of persons resort from the city. This house being situated on the top of a hill, affords a delightful prospect of the neighbouring country.

HORNSPIPE, a common instrument of music in Wales, consisting of a wooden pipe, with holes at stated distances, and a horn at each end; the one to collect the wind blown into it by the mouth, and the other to carry off the sounds as modulated by the performer.

HORNSPIPE is also the name of an English air, probably derived from the above instrument. The measure of this air is triple time, with six crotchets in a bar; four of which are to be beat with the hand down and two up. The dance which is accompanied with this lively tune, is also called a hornpipe.

HOROLOGIUM, ὡρολογιον, composed of ὥρα *bora*, "time, hour," and λογος "speech, discourse," a common name among ancient writers for any instrument or machine for measuring the hours; (see **CHRONOMETER**).—Such are our clocks, watches, sun-dials, &c. See **CLOCK**, **WATCH**, **DIAL**, and **CLEPSYDRA**.

Modern inventions, and gradual improvements, have given birth to some new terms that come properly under this head, and annexed new meanings to others totally different from what they had originally. All chronometers that announced the hour by striking on a bell, were called *clocks*: thus, we read of pocket-clocks, though nothing could seem more absurd than to suppose that a clock, according to the modern idea, should be carried in the pocket. In like manner, all clocks that did not strike the hour were called *watches* or *time-pieces*; and the different parts of a striking-clock were distinguished by the watch-part and the clock-part; the former meaning that part which measures the time, and the latter the part which proclaims the hours. In the report of Sir Isaac Newton to the house of commons, anno 1713, relative to the longitude act, he states the difficulties of ascertaining the longitude by means of a watch: yet it is obvious, from several circumstances, that his remarks were directly to be understood of a time-piece regulated by a pendulum; for his objections are founded on the known properties of the pendulum, some of which differ essentially from the properties of the balance and spring. It is also to be remembered, that all the attempts of Huygens for finding the longitude were by means of pendulum-clocks that did not strike the hour, and consequently, according to the language of the times, were called *watches*. At this time such machines for measuring time as are fixed in their place are called *clocks*, if they strike the hour: if they do not strike the hour, they are called *time-pieces*; and when constructed with more care, for a more accurate measure of time, they are called *regulators*. Some artists of late have affected to call such watches as were constructed for astronomical and nautical observations by the name of *time-pieces*, probably to intimate that they possess the advantages of those constructed with a pendulum.

Mr. John Harrison first gave the name of *time-keeper* to his watch, for the performance of which he received from parliament the sum of 20,000*l.* See **LONGITUDE**. For the account of the principles of this machine, see **TIME-KEEPER**. And for the chief improvements that have been made for the more accurate measure of time, see **PAILETS**, **PENDULUM**, and **SCAPEMENT**.

HOROSCOPE, in astrology, the degree or point of the heavens rising above the eastern point of the horizon at any given time when a prediction is to be made of a future event: as, the fortune of a person then born, the success of a design then laid, the weather, &c. The word is composed of ὥρα *bora*, "hour," and the verb σκοπεῖσθαι, *speleto*, *considero*, "I consider." They were formerly so infatuated with horoscopes, that Albertus Magnus, Cardan, and others, are said to have had the temerity to draw that of Jesus Christ.

HOROSCOPE is also used for a scheme or figure of the twelve houses; i. e. the twelve signs of the zodiac, wherein is marked the disposition of the heavens for any given time. Thus we say, to draw a horoscope, construct a horoscope, &c. We call it, more peculiarly, *calculating a nativity*, when the life and fortune of a person are the subject of the prediction; for they draw horoscopes of cities, great enterprises, &c. See **HOUSE**.

HOROSCOPY. See **DIVINATION**.

HORREA, in Roman antiquity, were public magazines of corn and salt meat, out of which the soldiers were furnished on their march in the military roads of the empire. *Horrea* was also the name which they gave to their granaries.

HORROX (JEREMIAH), an eminent English astronomer in the 17th century, was born at Toxteth near Liverpool in Lancashire in 1619. He died, to the great loss of that science and of the world, in the 23d year of his age, after he had just finished his *Venus in sole visa*; which, with some other works, were published by Dr. Wallis, in quarto.

HORROR, in the common acceptation of the word, signifies such an excess of fear as makes a person tremble. In medicine, it denotes a shivering and shaking of the whole body, coming by fits. It is common at the beginning of all fevers, but is particularly remarkable in those of the intermittent kind.

HORROR of a Vacuum, was an imaginary principle among the ancient philosophers, to which they ascribed the ascent of water in pumps, and other similar phenomena, which are now known to be occasioned by the weight of the air.

HORSE, in zoology. See the article **BARB**. Horses were very rare in Judæa till Solomon's time. Before him we find no horsemen mentioned in the armies of Israel. David having won a great battle against Hadadezer king of Shobah (2 Sam. viii. 4, 5.), took 1700 horses, and lamed all belonging to the chariots of war, reserving only 100 chariots. The judges and princes of Israel used generally to ride on mules or asses. After David's time, horses were more common in the country of Judah, &c. Solomon is the first king of Judah who had a great number of horses, and he kept them rather for pomp than for war; for we do not read that he made any military expeditions. He had, says the Scripture (1 Kings iv. 26.) 40,000 stalls of horses for his chariots, and 12,000 horsemen distributed in his fortified places (1 Kings x. 25). He had his horses from Egypt (*ibid.* ver. 28, 29.); and there was not a set which did not cost him more than 600 shekels, which make of our money about 90l. Moses had forbidden the king of the Hebrews to keep a great number of horses (Deut. xvii. 16.), lest at any time he should be inclined to carry the people back into Egypt.

We read in the second book of Kings (xxiii. 17.), that Josiah took away the horses which the kings of Judah his predecessors had consecrated to the Sun. We know the Sun was worshipped over all the east, and that the horse, the swiftest of tame beasts, was consecrated to this deity, who was represented as riding in a chariot drawn by the most beautiful and swiftest horses in the world, and performing every day his journey from east to west, in order to communicate his light to mankind. Xenophon describes a solemn sacrifice of horses, which was made with ceremony to the Sun: they were all the finest steeds, and were led with a white chariot, crowned, and consecrated to the same god. We may believe that the horses which Josiah removed out of the court of the temple, were appointed for the like sacrifices. The rabbins inform us, that these horses were every morning put to the chariots dedicated to the Sun, whereof there is mention made in the same book; and that the king, or some of his officers, got up and rode to meet the Sun in its rising, as far as from the eastern gate of the temple to the suburbs of Jerusalem. Others are of opinion, that the horses mentioned in the book of Kings were of wood, stone, or metal,

erected in the temple in honour of the Sun. Others, say they were horses which none were permitted to ride or fasten to the yoke, but were free, and left to themselves, like those which Julius Cæsar let loose and set at liberty after his passage of the Rubicon.

Horses were used both amongst the Greeks and Romans in war, but were not originally very numerous; for, as each horseman provided his own horse, few would be able to bear the expense. Horses for a considerable time were managed by the voice alone, or by a switch, without bridle, saddle, or stirrups. Their harness was skins of beasts, or sometimes cloth. Both horses and men amongst the Greeks underwent a severe probation before their admission into the cavalry. Horse-races were common amongst the Greeks and Romans, and the place where they ran or breathed their couriers was called *hippodromus*.

Management of a Horse upon and after a Journey. On this subject the following directions are given in the Sportsman's Dictionary. See that his shoes be not too strait, or press his feet, but be exactly shaped; and let him be shod some days before you begin a journey, that they may be settled to his feet.

Observe that he is furnished with a bit proper for him, and by no means too heavy, which may incline him to carry low, or to rest upon the hand when he grows weary, which horsemen call *making use of his fifth leg*. The mouth of the bit should rest upon his bars about half a finger's-breadth from his tusches, so as not to make him frumple his lips; the curb should rest in the hollow of his beard a little above the chin; and if it gall him, you must defend the place with a piece of buff or other soft leather. Be careful that the saddle do not rest upon his withers, loins, or back-bone, and that one part of it do not press his back more than another. Some riders gall a horse's sides below the saddle with their stirrup-leathers, especially if he be lean; to hinder it, you fix a leather-strap between the points of the fore and hind-bows of the saddle, and make the stirrup leather pass over them.

Begin your journey with short stages, especially if the horse has not been exercised for a long time. Suffer him to stale as often as you find him inclined; and not only so, but invite him to it.

It is advisable to ride very softly, for a quarter or half an hour before you arrive at the inn, that the horse not being too warm, nor out of breadth, when put into the stable, you may unbridle him: but if your business obliges you to put on sharply, you must then (the weather being warm) let him be walked in a man's hand, that he may cool by degrees; otherwise, if it be very cold, let him be covered with cloths, and walked up and down in some place free from wind; but in case you have not the convenience of a sheltered walk, stable him forthwith, and let his whole body be rubbed and dried with straw.

As soon as the horse is partly dried, and ceases to beat in the flanks, let him be unbridled, his bit washed, cleansed, and wiped, and let him eat his hay at pleasure. If he be very dry, and you have not given him water on the road, give him oats washed in mild ale. The dust and sand will sometimes so dry the tongues and mouths of horses, that they lose their appetites: in such case, give them bran well moistened with water to cool and refresh their mouths; or wash their mouths and tongues with a wet sponge, to oblige them to eat.

The foregoing directions are to be observed after moderate riding; but if you have rode excessively hard, unsaddle your horse, and scrape off the sweat with a scraper, holding it with both hands, and going always with the hair; then rub his head and ears with a large hair-cloth, wipe him also between the fore-legs and hind-legs; in the mean while, his body should be rubbed all over with straw, especially under his belly and

beneath the saddle, till he is thoroughly dry. That done, set on the saddle again, cover him; and if you have a warm place, let him be gently led up and down in it, for a quarter of an hour; but if not, let him dry where he stands. Or you may unsaddle him immediately; scrape off the sweat; let the ostler take a little vinegar in his mouth, and squirt it into the horse's; then rub his head, between the fore and hind-legs, and his whole body, till he is pretty dry. Let him not drink till thoroughly cool and has eaten a few oats; for many, by drinking too soon, have been injured. Set the saddle in the sun or by a fire, in order to dry the pannels.

When horses are arrived at an inn, a man should, before they are unbridled, lift up their feet, to see whether they want any of their shoes, or if those they have do not rest upon the quarters; afterwards he should pick and clear them of the earth and gravel, which may be got betwixt their shoes and soles.

If you water them abroad, upon their return from the river cause their feet to be stopped with cow-dung, which will ease the pain therein; and if it be in the evening, let the dung continue in their feet all night, to keep them soft and in good condition: but if your horse have brittle feet, it will be requisite to anoint the fore feet, at the on-setting of the hoofs, with butter, oil, or hog's grease, before you water him in the morning, and in dry weather they should be also greased at noon.

Many horses, as soon as unbridled, instead of eating, lay themselves down to rest, by reason of the great pain they have in their feet, so that a man is apt to think them sick: but if he looks at their eyes, he will see they are lively and good; and if he offers them meat as they are lying, they will eat it very willingly; yet if he handles their feet, he will find them extremely hot, which discovers their suffering in that part. You must therefore see if their shoes do not rest upon their soles, which is somewhat difficult to be certainly known without unshoeing them; but if you take off their shoes, then look to the inside of them, and you may perceive that those parts which rest upon the soles are more smooth and shining than the others: in this case you are to pare their feet in those parts, and fix on their shoes again, anointing the hoofs, and stopping the soles with hog's lard.

After a long day's journey, at night feel your horse's back if he be pinched, galled, or swelled; if you do not immediately discover it, perhaps you may after supper: there is nothing better than to rub it with good brandy, or with lead-water. If the galls are between the legs, use the same remedy; but if the ostler rubs him well between the legs, he will seldom be galled in that part.

In order to preserve horses after travelling, take these few useful instructions. When you are arrived from a journey, immediately draw the two heel-nails of the fore feet; and, if it be a large shoe, then four. Two or three days after, you may blood him in the neck, and feed him for 10 or 12 days only with wet bran, without giving him any oats; but keep him well littered. The reason why you are to draw the heel nails, is because the heels are apt to swell, and if they are not thus eased, the shoes will press and straighten them too much: it is also adviseable to stop them with cow-dung for a while; but do not take the shoes off, nor pare the feet, which is a bad practice.

The following bath will be very serviceable for preserving your horse's legs. Take the dung of a cow or ox, and make it thin with vinegar, so as to be of the consistence of thick broth; and having added a handful of small salt, rub his fore-legs from the knees, and the hind-legs from the gambrels, chafing them well with and against the hair, that the remedy may sink in and stick to those parts, that they may be all covered over with it. Thus leave the horse until morning, not wetting his legs, but giving him his water that evening in a pail: next morning

lead him to the river, or wash his legs in well-water, which is very good, and will keep them from swelling.

Those persons who, to recover their horses' feet, make a hole in them, which they fill with moistened cow-dung, and keep it in their fore feet during the space of a month, do very ill; because, though the continual moisture that issues from the dung occasions the growing of the hoof, yet it dries and shrinks it so excessively when out of that place, that it splits and breaks like glass, and the foot immediately straitens. For it is certain, that cow dung (contrary to the opinion of many people) spoils a horse's hoof: it does indeed moisten the sole; but it dries up the hoof, which is of a different nature from it. In order, therefore, to recover a horse's feet, instead of cow-dung, fill a hole with wet clay, and make him keep his fore-feet in it for a month.

Most horses that are fatigued, or over-ridden and made lean by long journeys, have their flanks altered without being purfy, especially vigorous horses that have worked too violently. There is no better method to recover them, than to give each of them in the morning half a pound of honey very well mingled with scalded bran; and when they readily eat the half pound, give them the next time a whole one, and afterwards two pounds, every day continuing this course till your horses are empty, and purge kindly with it; but as soon as you perceive that their purging ceases, forbear to give them any more honey. You may administer powder of liquorice in the scalded bran for a considerable time; and to cool the blood, it will not be improper to let them have three or four glisters. In case the horse be very lean, it is expedient to give him some wet bran, over and above his proportion of oats; and grass is also beneficial, if he be not purfy.

Sometimes excessive feeding may do horses more harm than good, by rendering them subject to the farcy. You should therefore be cautious in giving them too great a quantity at a time, and take a little blood from them now and then. When a horse begins to drink water heartily, it is a certain sign that he will recover in a short time. As to the method of giving him water during a journey, observe the following rules:

All the while you are upon a journey, let your horse drink of the first good water you come to, after seven o'clock in the morning if it be in summer-time, and after nine or ten in winter. That is accounted good water which is neither too clear and pellucid, nor too muddy and stinking. This is to be done, unless you would have him gallop a long time after drinking; for if so, you must forbear. Though it is the custom of England to run and gallop horses after drinking, which we call *watering-courses*, to bring them (as they say) *in'o wind*; yet, says M. de Solleysel, it is the most pernicious practice that can be imagined for horses, by which many are rendered purfy and broken-winded.

Notwithstanding a horse be warm, and sweat very much, yet if he is not quite out of breath, and you have still four or five miles to ride, he will be better after drinking a little, than if he had drank none at all.

If when you happen to bait he be hot or sweaty, you must not let him drink for a long time, as it would endanger his life; and when his bridle is taken off, his excessive thirst will hinder him greatly from eating, so that he will not offer to touch his meat for an hour or two, which perhaps your occasions will not allow you for a baiting time, and not to have any food will render him unfit to proceed.

If you meet with any ford before you come to your inn, it has been advised to ride the horse through it two or three times, but not up to his belly. This, it is true, cleanses his legs; but the coldness of the water may do him a mischief, and it is on the whole a bad practice.

If your horse has been very warm, and you have not had the

means of watering him upon the road, he will, when unbridled, eat but very little; therefore he should have his oats given him washed in ale or beer, or only a part of them, if you intend to feed him again after he has drank.

Some are of opinion, that horses are often hurt by giving them oats before their water; because they say the water makes the oats pass too soon, and leave the stomach undigested. But M. de Solleyfel affirms, that though it be the common custom not to do it till after, yet it is proper to feed with oats both before and after, especially if the horse be warm, and has been hard rode.

Breeding of Horses. On this subject M. Buffon makes the following remarks. When the stallion is chosen, and all the mares intended for him are collected together, there must be another stone-horse, to discover which of the mares are in heat; and, at the same time, contribute to inflame them. All the mares are to be brought successively to this stone-horse; which should also be inflamed, and suffered frequently to neigh. As he is for leaping every one, such as are not in heat keep him off, whilst those which are so suffer him to approach them. But instead of being allowed to satisfy his impulse, he must be led away, and the real stallion substituted in his stead. This trial is necessary for ascertaining the true time of the mare's heat, especially of those which have not yet had a colt; for with regard to such as have recently foaled, the heat usually begins nine days after their delivery; and on that very day they may be led to the stallion to be covered; and, nine days after, by the experiment above mentioned, it may be known whether they are still in heat. If they are, they must be covered a second time; and thus successively every ninth day while their heat continues: for when they are impregnated, their heat abates, and in a few days ceases entirely.

But that every thing may be done easily and conveniently, and at the same time with success and advantage, great attention, expence, and precaution are requisite. The stud must be fixed in a good soil, and in a suitable place, proportioned to the number of mares and stallions intended to be used. This spot must be divided into several parts, inclosed with rails or ditches well fenced; in the part where the pasture is the richest, the mares in foal, and those with colts by their sides, are to be kept. Those which are not impregnated, or have not yet been covered, are to be separated and kept with the fillies in another close, where the pasture is less rich, that they may not grow too fat, which would obstruct the progress of generation. Lastly, the young stone colts or geldings are to be kept in the driest part of the fields, and where the ground is most unequal; that by running over the uneven surface they may acquire a freedom in the motion of their legs and shoulders. This close, where the stone-colts are kept, must be very carefully separated from the others, lest the young horses break their bounds, and enervate themselves with the mares. If the tract be so large as to allow of dividing each of these closes into two parts, for putting oxen and horses into them alternately, the pasture will last much longer than if continually eaten by horses; the ox improving the fertility, whereas the horse lessens it. In each of these closes should be a pond; standing water being better than running, which often gripes them: and if there are any trees in the ground, they should be left standing, their shade being very agreeable to the horses in great heats; but all stems or stumps should be grubbed up, and all holes levelled, to prevent accidents. In these pastures your horses should feed during the summer; but in the winter the mares should be kept in the stable and fed with hay. The colts also must be housed, and never suffered to feed abroad in winter, except in very fine weather. Stallions that stand in the stable should be fed more with straw than hay; and moderately exercised till covering time, which generally lasts from the be-

ginning of April to the end of June. But during this season they should have no other exercise, and be plentifully fed, but with the same food as usual. Before the stallion is brought to the mare, he should be dressed, as that will greatly increase his ardour. The mare must also be curried, and have no shoes on her hind feet, some of them being ticklish, and will kick the stallion. A person holds the mare by the halter, and two others lead the stallion by long reins; when he is in a proper situation, another assistant carefully directs the yard, pulling aside the mare's tail, as a single hair might hurt him dangerously. It sometimes happens that the stallion does not complete the work of generation, coming from the mare without making any injection: it should therefore be attentively observed, whether, in the last moments of the copulation, the dock of the stallion's tail has a vibrating motion; for such a motion always accompanies the emission of the seminal liquor. If he has performed the act, he must on no consideration be suffered to repeat it; but be led away directly to the stable, and there kept two days. For, however able a good stallion may be for covering every day during the three months, it is much better to let him be led to a mare only every other day: his produce will be greater and he himself less exhausted. During the first seven days, let four different mares be successively brought to him; and the ninth day let the first be again brought, and so successively while they continue in heat: but as soon as the heat of any one is over, a fresh mare is to be put in her place, and covered in her turn every nine days; and as several retain even at the first, second, or third time, it is computed that a stallion, by such management, may, during the three months, cover 15 or 18 mares, and beget 10 or 12 colts. These animals have a very large quantity of the seminal liquor: so that a considerable portion of it is shed during the emission. In the mares likewise is an emission, or rather distillation of the seminal lymph, during the whole time they are horsing; ejecting a viscid whitish lymph, called the *beats*, which cease on conception. This ichor the Greeks called *hippomanes*; and pretended that philtres might be made of it, one remarkable effect of which was, to render a horse frantic with lust. This hippomanes is very different from that found in the secundines of the foal, which M. Daubenton first discovered, and has so accurately described its nature, origin, and situation. The ejection of this liquor is the most certain sign of the mare's heat; but it is also known by the inflation of the lower part of the vulva, by her frequent neighings, and attempts to get to the horses. After being covered, nothing more is requisite than to lead her away to the field. The first foal of a mare is never so strongly formed as the succeeding; so that care should be taken to procure for her, the first time, a larger stallion, that the defect of the growth may be compensated by the largeness of the size. Particular regard should also be had to the difference or congruity of the fashion of the stallion and the mare, in order to correct the faults of the one by the perfections of the other: especially never to make any disproportionate copulations, as of a small horse with a large mare, or a large horse with a small mare; as the produce of such copulation would be small, or badly proportioned. It is by gradations that we must endeavour to arrive at natural beauty: for instance, to give to a mare a little too clumsy, a well-made horse and finely shaped; to a small mare, a horse a little higher; to a mare which is faulty in her fore-hand, a horse with an elegant head and noble chest, &c.

It has been observed, that horses fed in dry and light grounds, produce temperate, swift, and vigorous foals, with muscular legs and a hard hoof; while the same bred in marshes and moist pastures have produced foals with a large heavy head, a thick carcase, clumsy legs, bad hoofs, and broad feet. These differences proceed from the air and food, which is easily understood; but what is more difficult to be accounted for, and

still more essential than what we have hitherto observed, is, to be continually crossing the breed to prevent a degeneracy.

In coupling of horses the colour and size should be suited to each other, the shape contrasted, and the breed crossed by an opposition of climates: but horses and mares foaled in the same stud should never be joined. These are essential articles: but there are others which should by no means be neglected; as that no short-docked mares be suffered in a stud, because from their being unable to keep off the flies, they are much more tormented by them than others which have a long sweeping tail; and their continual agitations from the stings of these insects, occasions a diminution in the quantity of their milk, and has a great influence on the constitution and size of the colt, which will be vigorous in proportion as its dam is a good nurse. Care must also be taken that the stud mares be such as have been always brought up in pastures, and never over-worked. Mares which have always been brought up in the stable on dry food, and afterwards turned to grass, do not breed at first: some time is required for accustoming them to this new aliment.

Though the usual season for the heat of mares be from the beginning of April to the end of June, yet it is not uncommon to find some among a large number that are in heat before that time: but it is advisable to let this heat pass over without giving them to the stallion, because they would foal in winter; and the colts, besides the inclemency of the season, would have bad milk for their nourishment. Again, if the mares are not in heat till after the end of June, they should not be covered that season, because the colts being foaled in summer, have not time for acquiring strength sufficient to repel the injuries of the following winter.

Many, instead of bringing the stallion to the mare, turn him loose into the close where all the mares are brought together; and there leave him to choose such as will stand to him. This is a very advantageous method for the mares: they will always take horse more certainly than in the other; but the stallion, in six weeks, will do himself more damage than in several years by moderate exercise, conducted in the manner we have already mentioned.

When the mares are pregnant, and their bellies begin to swell, they must be separated from those that are not, lest they hurt them. They usually go 11 months and some days; and foal standing, whereas most other quadrupeds lie down. Those that cannot foal without great difficulty, must be assisted; the foal must be placed in a proper situation; and sometimes, if dead, drawn out with cords. The head of the colt usually presents itself first, as in all other animals: at its coming out of the matrix, it breaks the secundines or integuments that inclose it, which is accompanied with a great flux of the lymph contained in them; and at the same time one or more solid lumps are discharged, formed by the sediment of the inspissated liquor of the allantoides. This lump, which the ancients called the *hippomanes of the colt*, is so far from being, as they imagined, a mass of flesh adhering to the head of the colt, that it is separated from it by a membrane called *amnios*. As soon as the colt is fallen, the mare licks it, but without touching the hippomanes; which points out another error of the ancients, who affirmed that she instantly devours it.

The general custom is to have a mare covered nine days after her foaling, that no time may be lost; but it is certain, that the mare having, by this means, both her present and future foal to nourish, her ability is divided, and she cannot supply both so largely as she might one only. It would therefore be better, in order to have excellent horses, to let the mares be covered only every other year: they would last the longer, and bring foals more certainly: for, in common studs, it is so far from being true that all mares which have been covered bring

colts every year, that it is considered as a fortunate circumstance if half or at most two thirds of them foal.

Mares, when pregnant, will admit of copulation; but it is never attended with any superfoetation. They usually breed till they are 14 or 15 years of age; and the most vigorous till they are above 18. Stallions, when well managed, will engender till the age of 20, and even beyond; but it must be observed, that such horses as are soonest made stallions, are also the soonest incapable of generation: thus the large horses, which acquire strength sooner than the slender, and are therefore often used as stallions as soon as they are four years old, are incapable of generation before they are sixteen.

Gelding of Horses. See GELDING.

Rearing of Horses. After the colts have been foaled, you may suffer them to run with the mare till about Michaelmas, sooner or later, according as the cold weather comes in; then they must be weaned; though some persons are for having them weaned after Martinmas, or the middle of November. The author of the *Complete Horseman* is of opinion, that the reason why most foals advance so slowly, and are not capable of service till they are six or seven years old, is because they have not sucked long enough; whereas, if they had sucked the whole winter over, they would be as good at four or five years old as they are now at eight.

They ought now to be kept in a convenient house, with a low rack and manger for their hay and oats, which must be sweet and good; with a little wheaten bran mixed with the oats to cause them to drink, and to keep their bodies open. But, since there are some who allege that oats make foals become blind, or their teeth crooked, the same author is of opinion, that oats will wear their teeth, and make them the sooner to change, and also to raze; therefore he judges it to be the best way to break them in a mill, because that by endeavouring with their jaws to bruise and chew them, they stretch and swell their eye and nether-jaw veins, which so attract the blood and humours that they fall down upon the eyes, and frequently occasion the loss of them: so that it is not the heating quality of the oats, but the difficulty in chewing, that is the cause of their blindness.

Further, colts thus fed with grain do not grow thickish upon their legs, but grow broader and better knit than if they had eaten nothing but hay and bran, and will endure fatigue the better. But above all they must be kept from wet and cold, which are hurtful to them, nothing being more tender than they are. For proof of this, take a Spanish stallion, and let him cover two mares, which for age, beauty, and comeliness, may admit of no difference between them; and if they produce both horse colts, or both fillies, which is one and the same thing, let one run abroad, and the other be housed every winter, kept warm, and ordinarily attended; and that colt that has been kept abroad shall have large fleshy shoulders, flabby and gouty legs, weak pasterns, and ill hoofs; and shall be a dull heavy jade, in comparison to the other which is housed and orderly kept; and which will have a fine forehead, be fine shaped, and have good legs and hoofs, and be of good strength and spirit: by which you may know, that to have the finest stallion, and the beautifullest mare, is nothing if they are spoiled in the breeding up. It is worth observation, that some foals under six months old, though their dams yield plenty of milk, yet decay daily, and have a cough, proceeding from certain pellicles or skins that breed in their stomachs, which obstruct their breathing, and at last destroy them entirely. To remedy this malady, take the bag wherein the colt was foaled, dry it, and give him as much of it in milk as you can take up with three fingers: but if you have not preserved the bag, procure the lungs of a young fox, and use it instead of the foresaid powder.

It will be proper to let the colts play an hour or two in some

court-yard, &c. when it is fair weather, provided you put them up again carefully, and see that they take no harm. When the winter is spent, turn them into some dry ground, where the grass is short and sweet, and where there is good water, that they may drink at pleasure: for it is not necessary that a colt should fill his belly immediately, like a horse that labours hard. The next winter you may take them into the house, and use them just as you do your other horses; but let not your horse colts and fillies be kept together after the first year. This method may be observed every summer and winter till you break them, which you may do after they have been three years old; and it will be a very easy thing, if you observe the aforesaid method of housing them: for, ordering them the second year as you do your other horses, they will be so tame and gentle, that you need not fear their leaping, plunging, kicking, or the like; for they will take the saddle quietly. As for all those ridiculous methods of beating and cowing them, they are in effect spoiling them, whatever they call it, in ploughed fields, deep ways, or the like; instead of which, let the rider strive to win them by gentle usage, never correcting them but when it is necessary, and then with judgment and moderation. You will not need a cavesson of cord, which is a head strain, nor a pad of straw; but only a common saddle, and a common cavesson on his nose, such as other horses are ridden with; but it ought to be well lined with double leather; and if you please you may put on his mouth a watering-bit, but without reins, only the head stall, and this but for a few days; and then put on such a bit as he should be always ridden with; and be sure not to use spurs for some time after backing. Take notice, that as yearlings must be kept abroad together, so those of two years old together: the like for those of three yearlings: which ordering is most agreeable to them.

In order to make him endure the saddle the better, the way to make it familiar to him will be by clapping the saddle with your hand as it stands upon his back, by striking it, and swaying upon it, dangling the stirrups by his sides, rubbing them against his sides, and making much of them, and bringing him to be familiar with all things about him; as straining the crupper, fastening and loosening the girths, and taking up and letting out the stirrups. Then as to the motion of him, when he will trot with the saddle obediently, you may wash a trench of a full mouth, and put the same into his mouth, throwing the reins over the forepart of the saddle, so that he may have a full feeling of it; then put on a martingale, buckled at such a length that he may but just feel it when he jerks up his head; then take a broad piece of leather, and put it about his neck, and make the ends of it fast by plaiting of it, or some other way, at the withers, and the middle part before his weasand, about two handfuls below the throple, betwixt the leather and his neck; let the martingale pass so, that when at any time he offers to duck, or throw down his head, the cavesson being placed upon the tender gristle of his nose, may correct and punish him; which will make him bring his head to, and form him to an absolute rein: trot him abroad; and if you find the reins or martingale grow slack, straiten them, for when there is no feeling there is no effect produced.

Draught-Horse, in farming, a sort of coarse-made horse destined for the service of the cart or plough. In the choice of these horses for what is called the *slow draught*, they are to be chosen of an ordinary height; for otherwise, when put into the cart, one draws unequally with the other. The draught-horse should be large bodied and strong loined, and of such a disposition as rather to be too dull than too brisk, and rather to crave the whip than to draw more than is needful. Mares are the fittest for this use with the farmer, as they will be kept cheap, and not only do the work, but be kept breeding, and give a yearly increase of a foal. They should have a good head,

neck, breast, and shoulders; for the rest of the shape, it is not of much consequence. Only, for breeding, the mare should have a large belly; for the more room a foal has in the dam, the better proportioned it will be. Draught horses should be always kept to that employ. Some put them to the saddle on occasion; but it does them great harm, alters their pace, and spoils them for labour. The draught-horse ought to have a large broad head, because horses of this shaped head are less subject than others to diseases of the eyes. The ears should be small, straight and upright; the nostrils large and open, that he may breathe with the more freedom. A horse with a full and bold eye always promises well. On the other hand, a sunk eye and an elevated brow are bad signs. The horse is esteemed fittest for this purpose also, that has a large and round buttock, which neither sinks down nor cuts. He must have a firm and strong tail, and the dock must be thick and well furnished with hair, and placed neither very high nor very low. The legs should be rather flat and broad than round: the roundness of the leg being a fault in a horse destined to labour that will soon ruin him. As to the hinder legs, the thighs should be fleshy and long, and the whole muscle which shows itself on the outside of the thigh should be large and very thick. No country can bring a parallel to the size and strength of our horses destined for the draught. In London there are instances of single horses that are able to draw on a plain, for a small space, the weight of 3 tons, and which can with ease, and for continuance, draw half that weight. The pack-horses of Yorkshire usually carry a burden of 420lb. over the highest hills of the north, as well as the most level roads: but the most remarkable proof of the strength of our British horses is derived from that of our mill horses; some of which will at one load carry 13 measures, which at a moderate computation of 70lb. each, will amount to 910lb. Nothing is so essential to the health of these serviceable creatures as cleanliness: if they are fed ever so well, and not kept clean, they will be subject to numerous diseases.

The servant who has the care of them ought to be up very early, and to clean the racks and mangers from all filth. The currying of them ought to be carefully performed every morning, but not in the stable, for the dust to fall upon the other horses, as it is too often done. After the horses are dusted, he should daily twist a whisp of straw hard up, and, wetting it in water, rub the legs, shoulders, and body with it. Many of the diseases of draught-horses, which are not owing to nastiness, are owing to bad water; such as are too raw, too muddy, or too cold, being all improper. If there be any running stream in the neighbourhood, they should always be led to that to water every day in summer; but in winter, well-water is warmest, and is better for them. If there be a necessity for giving them well-water in summer, it must be drawn up some hours before the time, and exposed to the sun-beams in tubs or troughs; marsh-water or that of lowland ditches is worst of all. When the labouring horse has drank his water, he should have his oats given him, and these should be carefully sifted, and the manger dusted first. It is a common practice, as soon as a horse is come in from his work, to rub down his legs with a hard whisp of hay; but the best judges of horses absolutely condemn this, and observe, that this rubbing of the legs after hard labour brings down humours into them, and makes them stiff.

The rubbing itself is wholesome, but the doing it when the creature is hot is the mischief; while a horse is in a sweat, it is a great relief and refreshment to him to have his body rubbed down, but when he is cold is the proper time to rub his legs. The racks are to be well supplied with hay, and the horses should be left to rest and eat, about two hours, and then led to water; after this their oats should be given them, and they should then go to work again.

In the evening, when the labour of the day is over, the first thing to be done is to examine the feet, and see if any thing is amiss about the shoes, and what earth or gravel is lodged in the foot, between the shoe and the sole, is to be picked out, and some fresh cow-dung put in its place, which will cool and refresh the part. A very material thing for the preservation of all sorts of cattle, but of none so much as draught-horses, is fresh and clean litter.

HORSE-Chefnut. See *ÆSCULUS*, and *HIPPOCASTANUM*.

HORSE-Guards. See *GUARDS*.

HORSE-Measure is a rod of box to slide out of a cane, with a square at the end, being divided into hands and inches to measure the height of horses.

HORSE-Muscle. See *MYTULUS*.

Race-HORSE. See *RACING*.

HORSE-Radish. See *COCHLEARIA*.

Horse-Shoe, a cover or defence for the sole of a horse's foot. See *FARRIERY*, p. 450. A patent has been lately obtained by Mr. Moorcroft for a mode of constructing horse-shoes by the assistance of a kind of die. This method may undoubtedly have a tendency to bring into more general use any particular description of shoe which may be thought advantageous; but it is liable, nevertheless, to some objections, particularly as shoes must not only vary in size, but must be adapted also to each minute peculiarity in the feet of different horses that have had their hoofs incurably injured by the mismanagement of ignorant farriers. Mr. Moorcroft describes his invention in the patent in these words: "First," says he, "I take bars of iron, or steel, or a composition of metals, of a breadth and thickness suitable to the horse-shoes I intend to make. Having heated these bars red-hot, (as is usual in the process of rolling and slitting iron,) I run them betwixt and through a pair of grooved rolls, turned by a horse-mill, or other power. The grooves in these rolls are various, according to the surfaces of the shoes intended to be made, and form the groove, and impressions for the heads of the nails, and regulate the thickness of the shoes; or simply regulate the thickness of the shoes, without making the groove, or impressions for the nails. Secondly, after the bars have been run betwixt and through the rolls, I cut them into different lengths, according to the size of the shoes intended to be made. Thirdly, I bend or turn them into the proper shape, either by hammer and anvil, or otherwise. Fourthly, when the shoes have been so turned, I heat them again red-hot, and strike them between dies fixed in a common fly-press, (such as is used for coining money,) or in stamps, such as are used for the same operation, or for giving impressions to other pieces of metal. These dies are engraved and formed in such a manner as to confirm to the shoe the proper thickness in the usual parts, and also to form the groove, and impressions for the nails, when not formed by the operation of rolling, as above-mentioned, or by any other operation; or they give the groove, without the impressions for the nails; or they give the impressions for the nails, without the groove. The rolls and dies respectively are to be cut with projecting parts, adapted to give the impressions for the nails or groove, if such impressions, or groove, are intended to be made; or plain, if those impressions or groove are not to be made by the rolls and dies respectively. The dies for these shoes must be formed in such a manner as to correspond with those parts of a horse's foot to which shoes are usually affixed; and, in consequence of the dies being so formed, the shoes struck by them are more perfect in their shape, and afford a truer and better support to the foot of the horse than the shoes in common use, and prevent many of the diseases incident to that part, from the manner of manufacturing horse-shoes now in common use."

HORSE-shoe head, a disease in infants, wherein the sutures of the skull are too open, or too great a vacuity is left between

them; so that the aperture shall not be totally closed up, or the cranium in that part not become so hard as the rest for some years after. This openness is thought to be increased upon the child's catching cold. When the disease continues long, it is reputed a sign of weakness and short life. In this case, it is usual to rub the head now and then with warm rum or brandy, mixed with the white of an egg and palm-oil. Sometimes the disorder arises from a collection of waters in the head called an *hydrocephalus*.

Stone-HORSE. See *STALLION*.

HORSE-Tail. See *EQUISETUM* and *EPHEDRA*.

HORSE-Vetch. See *HIPPOCREPIS*.

War-HORSE. The proper rules for choosing a horse for service in war, are these: he should be tall in stature, with a comely head, and out-swelling forehead. His eye should be bright and sparkling, and the white part of it covered by the eye-brow. The ears should be small, thin, short, and pricking; or if long, they should be moveable with ease, and well carried. The neck should be deep, and the breast large and swelling. The ribs bending, the chine broad and straight, and the buttocks round and full. The tail should be high and broad, neither too thick nor too thin; the thigh swelling; the leg broad and flat, and the pastern short. When such a horse is chosen, he must be kept high during the time of his teaching, that he may be full of vigour. His food must be sweet hay, and good clean oats, or two parts of oats and one part of beans or pease, well dried and hardened. The quantity should be half a peck in the morning, and the same quantity at noon and in the evening. Upon his resting days he is to be dressed between five and six in the morning, and watered at seven or eight. In the evening he is to be dressed at four, and watered about five, and he must always have provender given him after watering; he must be littered about eight, and then must have food given him for all night. The night before he is ridden, all his hay is to be taken away about nine o'clock, and he must have a handful or two of oats about four in the morning: when he has eaten these, he is to be turned upon the snaffle, and rubbed very well with dry cloths; then saddled, and made fit for his exercise. When he has performed this, he is to be brought sweating into the stable, and rubbed down with dry wisps. When this has been done, the saddle is to be taken off, and he is to be rubbed down with dry cloths; the housing cloth is then to be laid on; and the saddle being again laid on, he is to be walked gently about till thoroughly cool. After this, he must stand without meat two or three hours, then he must be fed; and in the afternoon he is to be rubbed and dressed as before, and watered in the usual manner.

HORSE-Worm, in natural history, a species of fly-worm called also *bott*, produced of eggs deposited by a two-winged fly, of the shape and size of the humble bee, in the anus of the horse. See *BOTTS*.

River-HORSE, in zoology. See *HIPPOPOTAMUS*.

HORSE is also used in the military language, to express the cavalry; or the body of soldiers who serve on horseback. The horse includes horse-guards, horse-grenadiers, and troopers. Dragoons are also frequently comprehended under this name, though they fight on foot: of these there are now 18 regiments; besides three regiments of dragoon-guards raised in 1685. See *GRANADIER*, *DRAGOONS*, and *GUARDS*.

Master of the HORSE. See *MASTER*.

Light-HORSE, are regiments of cavalry, mounted on light swift horses, whose men are small and lightly accoutred. They were first raised in 1757. The denomination arose hence, that anciently they were lightly armed, in comparison of the royal-guards, which were armed at all points.

HORSE is also a term used in various arts and manufactories, for something that helps to sustain their work from the ground,

for the more commodious working at it. The horse used by tanners and skinners, also called the *leg*, is a piece of wood cut hollow and roundish, four or five feet long, and placed aslope; upon which they pare their skins to get off the dirt, hair, flesh, &c.

HORSE is also used in carpentry, for a piece of wood jointed across two other perpendicular pieces, to sustain the boards, planks, &c. which make bridges over small rivers; and on various other occasions.

HORSE, in sea language, is the name of a rope reaching from the middle of a yard to its extremity, or what is called the *yard-arm*, and depending about two or three feet under the yard, for the sailors to tread upon whilst they are loosing, reefing, or furling the sails, rigging out the studding-sail booms, &c. In order, therefore, to keep the horse more parallel to the yard, it is usually suspended to it at proper distances, by certain ropes called stirrups, which hang about two feet under the yard, having an eye in their lower ends through which the horse passes.

HORSE is also a thick rope, extended in a perpendicular direction near the fore or after-side of a mast, for the purpose of hoisting or extending some sail upon it. When it is fixed before a mast, it is calculated for the use of a sail called the *square-sail*, whose yard being attached to the horse, by means of a traveller or bull's eye, which slides up and down occasionally, is retained in a steady position; either when the sail is set, or whilst it is hoisting or lowering. When the horse is placed abaft or behind a mast, it is intended for the try-sail of a ship, and is accordingly very rarely fixed in this position, except in those sloops of war which occasionally assume the form of snows, in order to deceive the enemy.

HORSE is also a cant name introduced into the management

of lotteries, for the chance or benefit of a ticket or number for one or more days, upon condition, if it be drawn a prize within the time covenanted for, of returning to the seller an undrawn ticket. To determine the value of a horse; multiply the amount of the prizes in the lottery by the time the horse is hired for; and from the product subtract the amount of the number of prizes by the value of an undrawn ticket into the time of the horse: the remainder being divided by the number of tickets into the whole time of drawing, the quotient is the value of the horse. See LOTTERY.

HORSE-Dung, in gardening, is of great use in making hot-beds, for the raising all sorts of early crops; as fallading, cucumbers, melons, asparagus, &c. for which purposes no other kinds of dung will do so well. Horse dung ferments the strongest; and if mixed with litter and sea-coal ashes in a due proportion, will continue its heat much longer than any other sort of dung whatsoever: and afterward, when rotted, becomes an excellent manure for most sorts of land; more especially for such as are of a cold nature. For stiff clayey land, horse-dung mixed with seal-coal ashes, and the cleansing of streets, will cause the parts to separate much sooner than any other compost: so that where it can be obtained in plenty, it is always to be recommended for such lands. See DUNG and HUSBANDRY.

Animated Horse-Hairs, a description applied to a sort of long and slender water-worm, of a blackish colour, and so much resembling a horse-hair, that it is generally, by the vulgar, supposed to be the hair fallen from a horse's mane into the water when drinking, and there animated by some strange power. Dr. Lister has at large confuted this absurd opinion in the *Philosophical Transactions*.

HORSE-Hair-Worms. See AMPHISENA.

HORSE-Hoeing Husbandry. See the article HUSBANDRY.

H O R S E M A N S H I P,

THE art of breaking, disciplining, and managing horses. This term, in its utmost latitude, includes what relates to the knowledge of the make, colour, age, temper and qualities, of horses; their respective countries and climates, with the manner of breeding, propagating, &c. the discovery of the uses or services they are fitted for; whether for war, the race, the saddle, or labour; and forwarding and accommodating them for these purposes.

In this general sense, it also includes the knowledge of the defects and diseases of horses, and the remedies proper for the same, with the several operations requisite thereto, as DOCKING, GELDING, SHOEING, &c. and thus takes in the farrier's province.

But the word is in a more peculiar manner understood of the art of riding, or of directing a horse to advantage; not only in the ordinary motions, but more especially in the maneing, or making him work upon voltes, airs, &c. and in this view chiefly we propose to consider it.

SECT. I. *The Method of preparing Horses to be mounted.*

THOUGH most horses are bought at an age when they have already been backed, they should be begun and prepared for the rider with the same care, gentleness, and caution, as if they had never been handled or backed, in order to prevent accidents, which might else arise from skittishness or other causes: and as it is proper that they should be taught the figure of the ground they are to go upon when they are at first mount-

ed, they should be previously trotted in a *longe* on circles, without any rider.

The earl of Pembroke's directions on this subject are these: Put an easy *caveçon* upon the horse's nose, and make him go forwards round you, standing quiet and holding the *longe*; and let another man, if you find it necessary, follow him with a whip. All this must be done very gently, and but a little at a time: for more horses are spoiled by overmuch work, than by any other treatment whatever; and that by very contrary effects; for sometimes it drives them into vice, madness, and despair, and often stupefies and totally dispirits them.

The first obedience required in a horse is going forwards; till he perform this duty freely, never even think of making him rein back, which would inevitably make him restive: as soon as he goes forwards readily, stop and caress him. You must remember in this, and likewise in every other exercise, to use him to go equally well to the right and left; and when he obeys, caress him and dismiss him immediately. If a horse that is very young takes fright and stands still, lead on another horse before him, which probably will induce him instantly to follow. Put a snaffle in his mouth; and when he goes freely, saddle him, girthing him at first very loose. Let the cord, which you hold, be long and loose; but not so much so as to endanger the horse's entangling his legs in it. It must be observed, that small circles, in the beginning, would constrain the horse too much, and put him upon defending himself. No bend must be required at first: never suffer him to gallop false; but whenever he at-

tempts it, stop him without delay, and then let him off afresh. If he gallops of his own accord, and true, permit him to continue it; but if he does it not voluntarily, do not demand it of him at first. Should he fly and jump, shake the cord gently upon his nose without jerking it, and he will fall into his trot again. If he stands still, plunges, or rears, let the man who holds the whip make a noise with it; but never touch him till it be absolutely necessary to make him go on. When you change hands, stop and caress him, and entice him by fair means to come up to you: for by presenting yourself, as some do, on a sudden before horses, and frightening them to the other side, you run a great risk of giving them a shyness. If he keeps his head too low, shake the *cavesson* to make him raise it; and in whatever the horse does, whether he walks, trots, or gallops, let it be a constant rule, that the motion be determined, and really such as is intended, without the least shuffling, pacing, or any other irregular gait.

SECT. II. *The Method of placing the Rider and rendering him firm on Horseback, with some occasional Instructions for Riders and their Horses.*

IT is necessary that the greatest attention, and the same gentleness that is used in teaching a horse, be observed likewise in teaching his rider, especially at the beginning. Every method and art must be practised to create and preserve, both in man and horse, all possible feeling and sensibility; contrary to the usage of most riding-masters, who seem industriously to labour at abolishing these principles both in the one and the other. As so many essential points depend upon the manner in which a man is at first placed on horseback, it ought to be considered and attended to with the strictest care and exactness.

The absurdity of putting a man, who perhaps has never before been upon a horse, on a rough trotting horse, on which he is obliged to stick with all the force of his arms and legs, is too obvious to need mentioning. This rough work, all at once, is plainly as detrimental at first, as it is excellent afterwards in proper time. No man can be either well or firmly seated on horseback, unless he be master of the balance of his body, quite unconstrained, with a full possession of himself, and at his ease; none of which requisites can he enjoy, if his attention be otherwise engaged; as it must wholly be in a raw, unsupplied, and unprepared lad, who is put at once upon a rough horse: in such a distressful state, he is forced to keep himself on at any rate, by holding to the bridle (at the expence of the sensibility both of his own hand and the horse's mouth), and by clinging with his legs, in danger of his life, and to the certain depravation of a right feeling in the horse.

The first time a man is put on horseback, it ought to be upon a very gentle one. He never should be made to trot, till he is quite easy in the walk; nor gallop, till he is able to trot properly. The same must be observed in regard to horses; they should never be made to trot till they are obedient, and their mouths are well formed on a walk; nor be made to gallop, till the same be effected on a trot. When he is arrived at such a degree of firmness in his seat, the more he trots, and the more he rides rough horses, the better. This is not only the best method, but also the easiest and the shortest: by it a man is soon made sufficiently an horseman for a soldier: but by the other detestable methods that are commonly used, a man, instead of improving, contracts all sorts of bad habits, and rides worse and worse every day; the horse too becomes daily more and more unfit for use. In proceeding according to the manner proposed, a man is rendered firm and easy upon the horse, both his own and the horse's sensibility is preserved, and each in a situation fit to receive and practise all lessons effectually.

Among the various methods that are used of placing people on horseback, few are directed by reason. Before you let the

man mount, teach him to know, and always to examine, if the curb be well placed, (that is, when the horse has a bit in his mouth, which at first he should not; but only a snaffle, till the rider is firm in his seat, and the horse also somewhat taught): likewise to know if the nose-band be properly tight; the throat-band loose; and the mouth-piece neither too high nor too low in the horse's mouth, but rightly put so as not to wrinkle the skin nor to hang lax; the girths drawn moderately, but not too tight; and the crupper and the breast-plate properly adjusted. A very good and careful hand may venture on a bit at first, and succeed with it full as well as by beginning with a snaffle alone; only with colts, indeed, it is better, in all schools whatsoever, to avoid any pressure on the bars just at first, which a curb, though ever so delicately used, must in some degree occasion. When the bridle, &c. have been well looked to, let the man approach the horse gently near the shoulder; then taking the reins and an handful of the mane in his left hand, let him put his foot softly in the left stirrup, by pulling it towards him, lest he touch the horse with his toe; then raising himself up, let him rest a moment on it with his body upright, but not stiff; and after that, passing his right leg clear over the saddle without rubbing against any thing, let him seat himself gently down. He must be cautious not to take the reins too short, for fear of making the horse rear, run, or fall back, or throw up his head; but let him hold them of an equal length, neither tight nor slack, and with the little finger betwixt them. It is fit that horses should be accustomed to stand still to be mounted, and not to stir till the rider pleases. All soldiers should be instructed to mount and dismount equally well on both sides, which may be of great use in times of hurry and confusion. Then place the man in his saddle, with his body rather back, and his head held up with ease, without stiffness; seated neither forwards, nor very backwards; with the breast pushed out a little, and the lower part of the body likewise a little forwards; the thighs and legs turned in without constraint, and the feet in a straight line, neither turned in nor out. By this position, the natural weight of the thighs has a proper and sufficient pressure of itself, and the legs are in readiness to act when called upon: they must hang down easy and naturally; and be so placed, as not to be wriggling about, touching, and tickling, the horse's sides, but always near them in case they should be wanted, as well as the heels.

The body must be carefully kept easy and firm, and without any rocking when in motion; which is a bad habit very easily contracted, especially in galloping. The left elbow must be gently leant against the body, a little forwards: unless it be so relied, the hand cannot be steady, but will always be checking, and consequently have pernicious effects on the horse's mouth. And the hand ought to be of equal height with the elbow; if it were lower, it would constrain and confine the motion of the horse's shoulders: but, as the mouths of horses are different, the place of the hand also must occasionally differ: a leaning, low, heavy, fore-hand requires a high hand; and a horse that pokes out his nose, a low one. The right-hand arm must be placed in symmetry with the left; only let the right-hand be a little forwarder or backwarder, higher or lower, as occasion may require, in order that both hands may be free; both arms must be a little bent at the elbow, to prevent stiffness.

A soldier's right-hand should be kept unemployed in riding; it carries the sword, which is a sufficient business for it.

There remains one farther observation, that ought not to be omitted, about the hand, that it must be kept clear of the body; *i. e.* about two inches and a half forwards from it, with the nails turned opposite to the belly, and the wrist a little rounded downwards; a position not less graceful than ready for slackening, tightening, and moving the reins from one side to the other, as may be found necessary.

When the men are well placed, the more rough trotting they have without stirrups the better; but with a strict care always that their position be preserved very exactly. In all cases, great care must be taken to hinder their clinging with their legs: in short, no sticking by hands or legs is ever to be allowed of at any time. If the motion of the horse be too rough, slacken it, till the rider grows by degrees more firm; and when he is quite firm and easy on his horse in every kind of motion, stirrups may be given him; but he must never leave off trotting often without any.

The stirrups must be neither short nor long; but of such a length, that when the rider, being well placed, puts his feet into them (about one third of the length of each foot from the point of it), the points may be between two and three inches higher than the heels. The rider must not bear upon his stirrups, but only let the natural weight of his legs rest on them: for if he bears upon them, he will be raised above and out of his saddle; which should never be, except in charging sword in hand, with the body inclined forwards at the very instant of attacking. Spurs may be given as soon as the rider is grown familiar with stirrups; or even long before, if his legs are well placed.

A hand should always be firm, but delicate: a horse's mouth should never be surprised by any sudden transition of it, either from slack to tight, or from tight to slack. Every thing in horsemanship must be effected by degrees, but at the same time with spirit and resolution. That hand which, by giving and taking properly, gains its point with the least force, is the best; and the horse's mouth, under this same hand's directions, will also consequently be the best, supposing equal advantages in both from nature. This principle of gentleness should be observed upon all occasions in every branch of horsemanship. Sometimes the right-hand may be necessary, upon some troublesome horses, to assist the left: but the seldomer this is done, the better; especially in a soldier, who has a sword to carry, and to make use of.

The snaffle must on all occasions be uppermost; that is to say, the reins of it must be above those of the bridle, whether the snaffle or the bit be used separately, or whether they be both used together. When the rider knows enough, and the horse is sufficiently prepared and settled to begin any work towards suppling, one rein must be shortened according to the side worked to; but it must never be so much shortened as to make the whole strength rest on that rein alone: for, not to mention that the work would be false and bad, one side of the horse's mouth would by that means be always deadened; whereas, on the contrary, it should always be kept fresh by its own play, and by the help of the opposite rein's acting delicately in a somewhat smaller degree of tension; the joint effect of which produces in a horse's mouth the proper, gentle, and easy degree of *appui* or bearing.

A coward and a madman make alike bad riders, and are both alike discovered and confounded by the superior sense of the creature they are mounted upon, who is equally spoiled by both, though in very different ways. The coward, by suffering the animal to have his own way, not only confirms him in his bad habits, but creates new ones in him: and the madman, by false and violent motions and corrections, drives the horse, through despair, into every bad and vicious trick that rage can suggest.

It is very requisite in horsemanship, that the hand and legs should act in correspondence with each other in every thing; the latter always subservient and assistant to the former. Upon circles, in walking, trotting, or galloping, the outward leg is the only one to be used, and that only for a moment at a time, in order to set off the horse true, or put him right if he be false; and as soon as that is done, it must be taken away again

immediately: but if the horse be lazy, or otherwise retains himself, both legs must be used and pressed to his sides at the same time together. The less the legs are used in general, the better. Very delicate good riders, with horses they have dressed themselves, will scarcely ever want their help. By the term *outward* is understood the side which is more remote from the centre; and by *inward* is meant the side next to the centre. In reining back, the rider should be careful not to use his legs, unless the horse backeth on his shoulders; in which case they must be both applied gently at the same time, and correspond with the hand. If the horse refuse to back at all, the rider's legs must be gently approached, till the horse lifts up a leg, as if to go forwards; at which time, when that leg is in the air, the rein of the same side with that leg which is lifted up, will easily bring that same leg backwards, and accordingly oblige the horse to back; but if the horse offers to rear, the legs must be instantly removed away. The inward rein must be tighter on circles, so that the horse may bend and look inwards; and the outward one crossed over a little towards it; and both held in the left hand.

Let the man and horse begin on very slow motions, that they may have time to understand and reflect on what is taught them; and in proportion as the effects of the reins are better comprehended, and the manner of working becomes more familiar, the quickness of motion must be increased. Every rider must learn to feel, without the help of the eye, when a horse goes false, and remedy the fault accordingly: this is an intelligence, which nothing but practice, application, and attention, can give, in the beginning on slow motions. A horse may not only gallop false, but also trot and walk false. If a horse gallops false, that is to say, if going to the right he leads with the left leg, or if going to the left he leads with the right; or in case he is disunited, i. e. if he leads with the opposite leg behind to that which he leads with before; stop him immediately, and put him off again properly. The method of effecting this, is by approaching your outward leg, and putting your hand outwards; still keeping the inward rein the shorter, and the horse's head inwards, if possible: and if he should still resist, then bend and pull his head outwards also; but replace it again, bent properly inwards, the moment he goes off true. A horse is said to be disunited to the right, when going to the right, and consequently leading with the right leg before, he leads with the left behind; and is said to be disunited to the left, when going to the left, and consequently leading with the left leg before, he leads with the right behind. A horse may at the same time be both false and disunited; in correcting both which faults, the same method must be used. He is both false and disunited to the right, when in going to the right he leads with the left leg before, and the right behind; notwithstanding that hinder leg be with propriety more forward under his belly than the left, because the horse is working to the right: and he is false and disunited to the left, when in going to the left he leads with the right leg before and the left behind; notwithstanding, as above, that hinder leg be with propriety more forward under his belly than the right, because the horse is working to the left.

In teaching men a right seat on horseback, the greatest attention must be given to prevent stiffness, and sticking by force in any manner upon any occasion: stiffness disgraces every right work; and sticking serves only to throw a man (when displaced) a great distance from his horse by the spring he must go off with: whereas, by a proper equilibrating position of the body, and by the natural weight only of the thighs, he cannot but be firm and secure in his seat.

As the men become more firm, and the horses more supple, it is proper to make the circles less; but not too much so, for fear of throwing the horses forwards upon their shoulders.

Some horses, when first the bit is put into their mouths, if great care be not taken, will put their heads very low. With such horses, raise your right hand with the *bridoon* in it, and play at the same time with the bit in the left hand, giving and taking.

On circles, the rider must lean his body inwards; unless great attention be given to make him do it, he will be perpetually losing his seat outwards. It is scarce possible for him to be displaced, if he leans his body properly inwards.

SECT. III. *The Method of suppling Horses with Men upon them, by the EPAULE en dedans, &c. with and without a Longe, on Circles and on straight Lines.*

WHEN a horse is well prepared and settled in all his motions, and the rider firm, it will be proper then to proceed on towards a farther suppling and teaching of both.

In setting out upon this new work, begin by bringing the horse's head a little more inwards than before, pulling the inward rein gently to you by degrees. When this is done, try to gain a little on the shoulders, by keeping the inward rein the shorter, as before, and the outer one crossed over towards the inward one. The intention of these operations is this: The inward rein serves to bring in the head, and procures the bend; whilst the outward one, that is a little crossed, tends to make that bend perpendicular, and as it should be, that is to say, to reduce the nose and the forehead to be in a perpendicular line with each other: it also serves, if put forwards, as well as also crossed, to put the horse forwards, if found necessary; which is often requisite, many horses being apt in this and other works rather to lose their ground backwards than otherwise, when they should rather advance; if the nose were drawn in towards the breast beyond the perpendicular, it would confine the motion of the shoulders, and have other bad effects. All other bends, besides what are above specified, are false. The outward rein, being crossed, not in a forward sense, but rather a little backwards, serves also to prevent the outward shoulder from getting too forwards, and makes it approach the inward one; which facilitates the inward leg's crossing over the outward one, which is the motion that so admirably supples the shoulders. Care must be taken that the inward leg pass over the outward one, without touching it: this inward leg's crossing over must be helped also by the inward rein, which you must cross towards and over the outward rein every time the outward leg comes to the ground, in order to lift and help the inward leg over it: at any other time, but just when the outer leg comes to the ground, it would be wrong to cross the inward rein, or to attempt to lift up the inward leg by it; nay, it would be demanding an absolute impossibility, and lugging about the reins and horse to no purpose: because in this case, a very great part of the horse's weight resting then upon that leg, would render such an attempt not only fruitless, but also prejudicial to the sensibility of the mouth, and probably oblige him to defend himself: and, moreover, it would put the horse under a necessity of straddling before, and also of leading with the wrong leg, without being productive of any suppling motion whatsoever.

When the horse is thus far familiarly accustomed to what you have required of him, then proceed to effect by degrees the same crossing in his hinder legs. By bringing in the fore-legs more, you will of course engage the hinder ones in the same work: if they resist, the rider must bring both reins more inwards; and, if necessary, put back also, and approach his inward leg to the horse; and if the horse throws out his croup too far, the rider must bring both reins outwards, and, if absolutely necessary, he must also make use of his outward leg, in order to replace the horse properly: observing that the croup should always be considerably behind the shoulders, which in

all actions must go first; and the moment that the horse obeys, the rider must put his hand and leg again in their usual position.

Nothing is more ungraceful in itself, more detrimental to a man's seat, or more destructive of the sensibility of a horse's sides, than a continual wriggling unsettledness in a horseman's legs, which prevents the horse from ever going a moment together true, steady, or determined.

A horse should never be turned, without first moving a step forwards: and when it is doing, the rider must not lift his elbow, and displace himself; a motion only of the hand from the one side to the other being sufficient for that purpose. It must also be a constant rule, never to suffer a horse to be stopped, mounted, or dismounted, but when he is well placed. The slower the motions are when a man or horse is taught any thing, the better.

At first, the figures worked upon must be great, and afterwards made less by degrees, according to the improvement which the man and horse make; and the cadenced pace also, which they work in, must be accordingly augmented. The changes from one side to the other, must be in a bold determined trot, and at first quite straight forwards, without demanding any side-motion on two *pistes*, which is very necessary to require afterwards when the horse is sufficiently suppled. By two *pistes* is meant, when the fore-parts and hinder parts do not follow, but describe two different lines.

In the beginning, a *longe* is useful on circles, and also on straight lines, to help both the rider and the horse; but afterwards, when they are grown more intelligent, they should go alone. At the end of the lesson, rein back; then put the horse, by a little at a time, forwards, by approaching both legs gently to his sides, and playing with the bridle: if he rears, push him out immediately into a full trot. Shaking the *cavesson* on the horse's nose, and also putting yourself before him and rather near to him, will generally make him back, though he otherwise refuse to do it: and moreover a slight use and approaching of the rider's legs, will sometimes be necessary in backing, in order to prevent the horse from doing it too much upon his shoulders; but the pressure of the legs ought to be very small, and taken quite away the moment that he puts himself upon his haunches. If the horse does not back upon a straight line properly, the rider must not be permitted to have recourse immediately to his leg, and so distort himself by it; but first try, if crossing over his hand and reins to whichever side may be necessary, will not be alone sufficient: which most frequently it will; if not, then employ the leg.

After a horse is well prepared and settled, and goes freely on in all his several paces, he ought to be in all his works kept, to a proper degree, upon his haunches, with his hinder legs well placed under him; whereby he will be always pleasant to himself and his rider, will be light in hand, and ready to execute whatever may be demanded of him, with facility, vigour, and quickness.

The common method that is used, of forcing a horse sideways, is a most glaring absurdity, and very hurtful to the animal in its consequences; for instead of suppling him, it obliges him to stiffen and defend himself, and often makes a creature that is naturally benevolent, restless, frightened, and vicious.

For horses, who have very long and high fore-hands, and who poke out their noses, a running snaffle is of excellent use; but for such as bore and keep their heads low, a common one is preferable; though any horse's head indeed may be kept up also with a running one, by the rider's keeping his hands very high and forwards: but whenever either is used alone without a bridle upon horses that carry their heads low and that bore, it must be sawed about from one side to the other.

This lesson of the *epaule en dedans* should be taught to such people as are likely to become useful in helping to teach men and to break horses; and the more of such that can be found the better: none others should ever be suffered upon any occasion to let their horses look any way besides the way they are going. But all horses whatever, as likewise all men who are designed for the teaching others, must go thoroughly and perfectly through this excellent lesson, under the directions of intelligent instructors, and often practise it too afterwards; and when that is done, proceed to, and be finished by, the lessons of head and tail to the wall.

SECT. IV. *Of the Head to the Wall, and of the Croup to the Wall.*

THIS lesson should be practised immediately after that of the *epaule en dedans*, in order to place the horse properly the way he goes, &c. The difference between the head to the wall, and the croup to the wall, consists in this: In the former, the fore-parts are more remote from the centre, and go over more ground; in the latter, the hinder parts are more remote from the centre, and consequently go over more ground: in both, as likewise in all other lessons, the shoulders must go first. In riding-horses, the head to the wall is the easier lesson of the two at first, the line to be worked upon being marked by the wall, not far from his head.

The motion of the legs to the right, is the same as that of the *epaule en dedans* to the left, and so *vice versa*; but the head is always bent and turned differently: in the *epaule en dedans*, the horse looks the contrary way to that which he goes; in this, he looks the way he is going.

In the beginning, very little bend must be required: too much at once would astonish the horse, and make him defend himself: it is to be augmented by degrees. If the horse absolutely refuses to obey, it is a sign that either he or his rider has not been sufficiently prepared by previous lessons. It may happen that weakness or a hurt in some part of the body, or sometimes temper, though seldom, may be the cause of the horse's defending himself: it is the rider's business to find out from whence the obstacle arises; and if he finds it to be from the first-mentioned cause, the previous lessons must be resumed again for some time; if from the second, proper remedies must be applied; and if from the last cause, when all fair means that can be tried have failed, proper corrections with coolness and judgment must be used.

In practising this lesson to the right, bend the horse to the right with the right rein; helping the left leg over the right (at the time when the right leg is just come to the ground), with the left rein crossed towards the right, and keeping the right shoulder back with the right rein towards your body, in order to facilitate the left leg's crossing over the right; and so likewise *vice versa* to the left, each rein helping the other by their properly mixed effects. In working to the right, the rider's left leg helps the hinder-parts on to the right, and his right leg stops them if they get too forwards; and so *vice versa* to the left: but neither ought to be used, till the hand being employed in a proper manner has failed, or finds that a greater force is necessary to bring about what is required than it can effect alone: for the legs should not only be corresponding with, but also subservient to, the hand; and all unnecessary aids, as well as all force, ought always to be avoided as much as possible.

In the execution of all lessons the equilibrium of the rider's body is of great use to the horse: it ought always to go with and accompany every motion of the animal; when to the right, to the right; and when to the left, to the left.

Upon all horses, in every lesson and action, it must be observed, that there is no horse but has his own peculiar appui or degree of bearing, and also a sensibility of mouth, as likewise a

rate of his own, which it is absolutely necessary for the rider to discover, and make himself acquainted with. A bad rider always takes off at least the delicacy of both, if not absolutely destroys it. The horse will inform his rider when he has got his proper bearing in the mouth, by playing pleasantly and steadily with his bit, and by the spray about his chaps. A delicate and good hand will not only always preserve a light appui or bearing in its sensibility; but also of a heavy one, whether naturally so or acquired, make a light one. The lighter this appui can be made, the better; provided that the rider's hand corresponds with it: if it does not, the more the horse is properly prepared, so much the worse. Instances of this inconvenience of the best of appuis, when the rider is not equally taught with the horse, may be seen every day in some gentlemen, who try to get their horses *bitted*, as they call it, without being suitably prepared themselves for riding them: the consequence of which is, that they ride in danger of breaking their necks; till at length, after much hauling about, and by the joint insensibility and ignorance of themselves and their grooms, the poor animals gradually become mere senseless unfeeling posts; and thereby grow what they call *settled*. When the proper appui is found, and made of course as light as possible, it must not be kept duly fixed without any variation, but be played with; otherwise one equally continued tension of reins would render both the rider's hand and the horse's mouth very dull. The slightest and frequent giving and taking is therefore necessary to keep both perfect.

Whatever pace or degree of quickness you work in, be it ever so fast, or ever so slow, it must be cadenced; time is as necessary for an horseman as for a musician.

This lesson of the head and of the tail to the wall, must be taught every soldier: scarce any manœuvre can be performed without it. In closing and opening of files, it is almost every moment wanted.

SECT. V. *The Method of making Horses stand Fire, and endure Noises, Alarms, Sights, &c.*

IN order to make horses stand fire, the sound of drums, and all sorts of different noises, you must use them to it by degrees in the stable at feeding-time; and instead of being frightened at it, they will soon come to like it as a signal for eating.

With regard to such horses as are afraid of burning objects, begin by keeping them still at a certain distance from some lighted straw: caress the horse; and in proportion as his fright diminishes, approach gradually the burning straw very gently, and increase the size of it. By this means he will very quickly be brought to be so familiar with it, as to walk undaunted even through it.

As to horses that are apt to lie down in the water, if animating them, and attacking them vigorously, should fail of the desired effect, then break a straw-bottle full of water upon their heads, and let the water run into their ears, which is a thing they apprehend very much.

All troop-horses must be taught to stand quiet and still when they are shot off from, to stop the moment you present, and not to move after firing till they are required to do it; this lesson ought especially to be observed in light troops: in short, the horses must be taught to be so cool and undisturbed, as to suffer the rider to act upon him with the same freedom as if he was on foot. Patience, coolness, and temper, are the only means requisite for accomplishing this end. Begin by walking the horse gently, then stop and keep him from stirring for some time, so as to accustom him by degrees not to have the least idea of moving without orders: if he does, then back him; and when you stop him, and he is quite still, leave the reins quite loose.

To use a horse to fire-arms, first put a pistol or a carbine in the manger with his feed; then use him to the sound of the

lock and the pan; after which, when you are upon him, show the piece to him, presenting it forwards, sometimes on one side, sometimes on the other: when he is thus far reconciled, proceed to flash in the pan; after which, put a small charge into the piece, and so continue augmenting it by degrees to the quantity which is commonly used: if he seems uneasy, walk him forward a few steps slowly; and then stop, back and caress him. Horses are often also disquieted and unsteady at the flash, and drawing, and returning of swords; all which they must be familiarised to by little and little, by frequency and gentleness.

It is very expedient for all cavalry in general, but particularly for light cavalry, that their horses should be very ready and expert in leaping over ditches, hedges, gates, &c. The leaps, of whatever sort they are, which the horses are brought to in the beginning, ought to be very small ones; the riders must keep their bodies back, raise their hands a little in order to help the fore-parts of the horse up, and be very attentive to their equilibrium. It is best to begin at a low bar covered with furze, which pricking the horse's legs, if he does not raise himself sufficiently, prevents his contracting a sluggish and dangerous habit of touching, as he goes over, which any thing yielding and not pricking would give him a custom of doing. Let the ditches you first bring horses to be narrow; and in this, as in every thing else, let the increase be made by degrees. Accustom them to come up to every thing which they are to leap over, and to stand coolly at it for some time; and then to raise themselves gently up in order to form to themselves an idea of the distance. When they leap well standing, then use them to walk gently up to the leap, and to go over it without first halting at it; and after that practice is familiar to them, repeat the like in a gentle trot, and so by degrees faster and faster, till at length it is as familiar to them to leap flying on a full gallop as any other way: all which is to be acquired with great facility by calm and soft means, without any hurry.

As horses are naturally apt to be frightened at the sight and smell of dead horses, it is advisable to habituate them to walk over and leap over carcasses of dead horses: and as they are particularly terrified at this sight, the greater gentleness ought consequently to be used.

Horses should also be accustomed to swim, which often may be necessary upon service; and if the men and horses both are not used to it, both may be frequently liable to perish in the water. A very small portion of strength is sufficient to guide a horse, any where indeed, but particularly in the water, where they must be permitted to have their heads, and be no-ways constrained in any shape.

The unreasonable rage in Britain of cutting off all extremities from horses, is in all cases a very pernicious custom. It is particularly so in regard to a troop-horse's tail. It is almost incredible, how much they suffer at the picket for want of it; constantly fretting and sweating, kicking about and laming one another, tormented and stung off their meat, miserable and helpless; whilst other horses, with their tails on, brush off all flies, are cool and at their ease, and mend daily; whilst the docked ones grow every hour more and more out of condition.

SECT. VI. *The Method of reining back, and of moving forwards immediately after. Of Piasing, Pillars, &c.*

NEVER finish your work by reining back with horses that have any disposition towards retaining themselves; but always move them forwards, and a little upon the haunches also, after it, before you dismount (unless they retain themselves very much indeed, in which case nothing at all must be demanded from the haunches). This lesson of reining back, and piasing, is excellent to conclude with, and puts an horse well and

properly on the haunches: It may be done, according as horses are more or less suppled, either going forward, backing, or in the same place: if it is done well advancing, or at most on the same spot, it is full sufficient for a soldier's horse. For to piasse in backing, is rather too much to be expected in the hurry which cannot but attend such numbers both of men and horses as must be taught together in regiments. This lesson must never be attempted at all, till horses are very well suppled, and somewhat accustomed to be put together; otherwise it will have very bad consequences, and create restiveness. If they refuse to back, and stand motionless, the rider's legs must be approached with the greatest gentleness to the horse's sides; at the same time that the hand is acting on the reins to solicit the horse's backing. This seldom fails of procuring the desired effect, by raising one of the horse's fore legs, which being in the air, has no weight upon it, and is consequently very easily brought backwards by a small degree of tension in the reins. When this lesson is well performed, it is very noble and useful, and has a pleasing air; it is an excellent one to begin teaching scholars with.

The lesson is particularly serviceable in the pillars, for placing scholars well at first. Very few regimental riding houses have pillars, and it is fortunate they have not: for though, when properly made use of with skill, they are one of the greatest and best discoveries in horsemanship; they must be allowed to be very dangerous and pernicious, when they are not under the direction of a very knowing person.

SECT. VII. *The Method of curing Restiveness, Vice, Defences, Starting, &c.*

WHENEVER a horse makes resistance, one ought, before remedy or correction is thought of, to examine very minutely all the tackle about him, if any thing hurts or tickles him, whether he has any natural or accidental weakness, or in short any the least impediment in any part. For want of this precaution, many fatal disasters happen: the poor dumb animal is frequently accused falsely of being restive and vicious; is used ill without reason; and, being forced into despair, is in a manner obliged to act accordingly, be his temper and inclination ever so well disposed. It is very seldom the case, that a horse is really and by nature vicious; but if such be found, he will despise all caresses, and then chastisements become necessary.

Correction, according as you use it, throws a horse into more or less violent action, which, if he be weak, he cannot support: but a vicious strong horse is to be considered in a very different light, being able both to undergo and consequently to profit by all lessons; and is far preferable to the best-natured weak one upon earth. Patience and attention are never-failing means to reclaim such a horse: in whatsoever manner he defends himself, bring him back frequently with gentleness (not however without having given him proper chastisement if necessary) to the lesson which he seems most averse to. Horses are by degrees made obedient, through the hope of recompense and the fear of punishment. How to mix these two motives judiciously together, is a very difficult matter; it requires much thought and practice; and not only a good head, but a good heart likewise. The coolest and best-natured rider will always succeed best. By a dexterous use of the incitements above mentioned, you will gradually bring the horse to temper and obedience; mere force, and want of skill and coolness, would only tend to confirm him in bad tricks. If he be impatient or cholerick, never strike him, unless he absolutely refuse to go forwards; which you must resolutely oblige him to do, and which will be of itself a correction, by preventing his having time to meditate and put in execution any defence by retaining himself. Resistance in horses, you must consider, is sometimes a mark of strength and vigour, and proceeds from spirit, as well as some-

times from vice and weakness. Weakness frequently drives horses into viciousness, when any thing wherein strength is necessary is demanded from them; nay, it inevitably must: great care therefore should always be taken to distinguish from which of these two causes any remedy or punishment is thought of. It may sometimes be a bad sign when horses do not at all defend themselves, and proceed from a sluggish disposition, a want of spirit, and of a proper sensibility. Whenever one is so fortunate as to meet with a horse of just the right spirit, activity, delicacy of feeling, with strength and good nature, he cannot be cherished too much; for such a one is a rare and inestimable jewel, and, if properly treated, will in a manner do every thing of himself. Horses are oftener spoiled by having too much done to them, and by attempts to dress them in too great an hurry, than by any other treatment.

If after a horse has been well supplied, and there are no impediments, either natural or accidental, if he still persists to defend himself, chastisements then become necessary: but whenever this is the case, they must not be frequent, but always firm, though always as little violent as possible; for they are both dangerous and very prejudicial when frequently or slightly played with, and still more so when used too violently.

It is impossible, in general, to be too circumspect in lessons of all kinds, in aids, chastisements, or caresses. Some have quicker parts and more cunning than others. Many will imperceptibly gain a little every day on the rider. Various, in short, are their dispositions and capacities. It is the rider's business to find out their different qualities, and to make them sensible how much he loves them, and desires to be loved by them; but at the same time that he does not fear them, and will be master.

Plunging is a very common defence among restive and vicious horses: if they do it in the same place, or backing, they must, by the rider's legs and spurs firmly applied, be obliged to go forwards, and their heads kept up high. But if they do it flying forwards, keep them back, and ride them gently and very slow for a good while together. Of all bad tempers and qualities in horses, those which are occasioned by harsh treatment and ignorant riders are the worst.

Rearing is a bad vice, and, in weak horses especially, a very dangerous one. Whilst the horse is up, the rider must yield his hand; and when the horse is descending, he must vigorously determine him forwards: if this be done at any other time but whilst the horse is coming down, it may add a spring to his rearing, and make him fall backwards. With a good hand on them, horses seldom persist in this vice; for they are themselves naturally much afraid of falling backwards. If this method fails, you must make the horse kick up behind, by getting somebody on foot to strike him behind with a whip; or, if that will not effect it, by pricking him with a goad.

Starting often proceeds from a defect in the sight; which therefore must be carefully looked into. Whatever the horse is afraid of, bring him up to it gently; if you caress him every step he advances, he will go quite up to it by degrees, and soon grow familiar with all sorts of objects. Nothing but great gentleness can correct this fault; for if you inflict punishment, the apprehension of chastisement becomes prevalent, and causes more starting than the fear of the object. If you let him go by the object, without bringing him up to it, you increase the fault, and confirm him in his fear: the consequence of which is, he takes his rider perhaps a quite contrary way from what he was going, becomes his master, and puts himself and the person upon him every moment in great danger.

With such horses as are to a very great degree fearful of any objects, make a quiet horse, by going before them, gradually entice them to approach nearer and nearer to the thing they are afraid of. If the horse, thus alarmed, be undisciplined and

headstrong, he will probably run away with his rider; and if so, his head must be kept up high, and the snaffle sawed backwards and forwards from right to left, taking up and yielding the reins of it, as also the reins of the bit: but this latter must not be sawed backwards and forwards like the snaffle, but only taken up and yielded properly. No man ever yet did, or ever will, stop a horse, or gain any one point over him, by main force, or by pulling a dead weight against him.

SECT. VIII. *Rules for bad Horsemen.*

ON this subject Mr. Thompson has given the following rules.

In the first place, every horse should be accustomed to stand still when he is mounted. One would imagine this might be readily granted; yet we see how much the contrary is practised. When a gentleman mounts at a livery-stable, the groom takes the horse by the bit, which he bends tight round his under jaw: the horse, striving to go on, is forced back; advancing again, he frets, as he is again stopped short, and hurt by the manner of holding him. The rider, in the mean time, mounting without the bridle, or at least holding it but slightly, is helped to it by the groom, who being thoroughly employed by the horse's flustering, has at the same time both bridle and stirrup to give. This confusion would be prevented, if every horse were taught to stand still when he is mounted. Forbid your groom, therefore, when he rides your horse to water, to throw himself over him from a horse-block, and kick him with his leg even before he is fairly upon him. This wrong manner of mounting is what chiefly teaches your horse the vicious habit against which we are here warning. On the other hand, a constant practice of mounting in the proper manner, is all that is necessary to prevent a horse's going on till the rider is quite adjusted in the saddle.

The next thing necessary therefore is, that the rider should mount properly. The common method is to stand near the croup or hinder part of the horse, with the bridle held very long in the right hand. By this manner of holding the bridle before you mount, you are liable to be kicked; and when you are mounted, your horse may go on some time, or play what gambols he pleases, before the rein is short enough in your hand to prevent him. It is common likewise for an awkward rider, as soon as his foot is in the stirrup, to throw himself with all his force to gain his seat; which he cannot do, till he hath first overbalanced himself on one side or the other: he will then wriggle into it by degrees. The way to mount with ease and safety is, to stand rather before than behind the stirrup. In this posture take the bridle short, and the mane together in your left hand, helping yourself to the stirrup with your right, so that your toe may not touch the horse in mounting. When your left foot is in the stirrup, move on your right, till you face the side of the horse, looking across over the saddle. Then with your right hand grasp the hinder part of the saddle; and with that and your left, which holds the mane and bridle, list yourself upright on your left foot. Remain thus a mere instant on your stirrup, only so as to divide the action into two motions. While you are in this posture, you have a sure hold with both hands, and are at liberty, either to get safely down, or to throw your leg over and gain your seat. By this deliberate motion, likewise, you avoid, what every good horseman would endeavour to avoid, putting your horse into a flutter.

When you dismount, hold the bridle and mane together in your left hand, as when you mounted; put your right hand on the pommel of the saddle, to raise yourself; throw your leg back over the horse, grasp the hinder part of the saddle with your right hand, remain a moment on your stirrup, and in every respect dismount as you mounted; only what was your first motion when you mounted, becomes the last in dismounting. Remember not to bend your right knee in dismounting, lest your spur should rub against the horse.

It may be next recommended to hold your bridle at a convenient length. Sit square, and let not the purchase of the bridle pull forward your shoulder; but keep your body *even*, as it would be if each hand held a rein. Hold your reins with the whole grasp of your hand, dividing them with your little finger. Let your hand be perpendicular; your thumb will then be uppermost, and placed on the bridle. Bend your wrist a little outward; and when you pull the bridle, raise your hand toward your breast, and the lower part of the palm rather more than the upper. Let the bridle be at such a length in your hand, as, if the horse should stumble, you may be able to raise his head, and support it by the strength of your arms, and the weight of your body thrown backward. If you hold the rein too long, you are subject to fall backward as your horse rises.

If, knowing your horse perfectly well, you think a tight rein unnecessary, advance your arm a little (but not your shoulder) towards the horse's head, and keep your usual length of rein. By this means, you have a check upon your horse, while you indulge him.

If you ride with a curb, make it a rule to hook on the chain yourself; the most quiet horse may bring his rider into danger, should the curb hurt him. If, in fixing the curb, you turn the chain to the right, the links will unfold themselves, and then oppose a farther turning. Put on the chain loose enough to hang down on the horse's under lip, so that it may not rise and press his jaw, till the reins of the bridle are moderately pulled.

If your horse has been used to stand still when he is mounted, there will be no occasion for a groom to hold him: but if he does, suffer him not to touch the reins, but that part of the bridle which comes down the cheek of the horse. He cannot then interfere with the management of the reins, which belongs to the rider only; and holding a horse by the curb (which is ever painful to him) is evidently improper when he is to stand still.

Another thing to be remembered is, not to ride with your arms and elbows as high as your shoulders; nor let them shake up and down with the motion of the horse. The posture is unbecoming, and the weight of the arms (and of the body too if the rider does not sit still) acts in continual jerks on the jaw of the horse, which must give him pain, and make him unquiet, if he has a tender mouth or any spirit.

Bad riders wonder why horses are gentle as soon as they are mounted by skilful ones, though their skill seems unemployed: the reason is, the horse goes at his ease, yet finds all his motions watched; which he has sagacity enough to discover. Such a rider hides his whip, if he finds his horse is afraid of it; and keeps his legs from his sides, if he finds he dreads the spur.

Avoid the ungraceful custom of letting your legs shake against the sides of the horse: and as you are not to keep your arms and elbows high, and in motion; so you are not to rivet them to your sides, but let them fall easy. One may, at a distance, distinguish a genteel horseman from an awkward one: the first sits still, and appears of a piece with his horse; the latter seems flying off at all points.

It is often said with emphasis, that such a one has no *seat* on horseback; and it means, not only that he does not ride well, but that he does not sit on the right part of the horse. To have a *good seat*, is to sit on that part of the horse, which, as he springs, is the centre of motion; and from which, of course, any weight would be with most difficulty shaken. As in the rising and falling of a board placed in *æquilibrio*, the centre will be always most at rest; the true seat will be found in that part of your saddle, into which your body would naturally slide, if you rode without stirrups; and is only to be preserved by a proper poise of the body, though the generality of riders imagine it is to be done by the grasp of the thighs and knees. The rider should consider himself as united to his horse in this point; and, when shaken from it, endeavour to restore the balance.

Perhaps the mention of the two extremes of a bad seat may help to describe the true one. The one is, when the rider sits very far back on the saddle, so that his weight presses the loins of the horse; the other, when his body hangs forward over the pommel of the saddle. The first may be seen practised by grooms, when they ride with their stirrups affectedly short; the latter, by fearful horsemen on the least flutter of the horse.

Every *good* rider has, even on the hunting saddle, as *determined* a place for his thighs, as can be determined for him by the bars of a demi-peak. Indeed there is no difference between the seat of either: only, as in the first you ride with shorter stirrups, your body will be consequently more behind your knees.

To have a good seat yourself, your saddle must sit well. To fix a precise rule might be difficult: it may be a *direction*, to have your saddle press as nearly as possible on that part which we have described as the point of union between the man and horse; however, so as not to obstruct the motion of the horse's shoulders. Place yourself in the middle or lowest part of it: sit erect; but with as little constraint as in your ordinary sitting. The ease of action marks the gentleman: you may repose yourself, but not lounge. The set and studied erectness acquired in the riding-house, by those whose deportment is not easy, appears ungenteel and unnatural.

If your horse stops short, or endeavours by rising and kicking to unseat you, bend not your body forward, as many do in those circumstances: that motion throws the breech backward, and you off your fork or twist, and out of your seat; whereas, the advancing the lower part of your body, and bending back the upper part and shoulders, is the method both to keep your seat, and to recover it when lost. The bending your body back, and that in a great degree, is the greatest security in *flying* leaps; it is a security too, when your horse leaps *standing*. The horse's rising does not try the rider's seat; the lash of his hind-legs is what ought chiefly to be guarded against, and is best done by the body's being greatly inclined back. Stiffen not your legs or thighs; and let your body be pliable in the loins, like the coachman's on his box. This loose manner of sitting will elude every rough motion of the horse; whereas the fixture of the knees, so commonly laid a stress on, will in great shocks conduce to the violence of the fall.

Were the cricket-player, when the ball is struck with the greatest velocity, to hold his hand firm and fixed when he receives it, the hand would be bruised, or perhaps the bones fractured by the resistance. To obviate this accident, he therefore gradually yields his hand to the motion of the ball for a certain distance; and thus, by a due mixture of opposition and obedience, catches it without sustaining the least injury. The case is exactly the same in riding: the skilful horseman will recover his poise by giving some way to the motion; and the ignorant horseman will be flung out of his seat by endeavouring to be fixed.

Stretch not out your legs before you; this will push you against the back of the saddle: neither gather up your knees, like a man riding on a pack; this throws your thighs upwards: each practice unseats you. Keep your legs straight down; and sit not on the most fleshy part of the thighs, but turn them inwards, so as to bring in your knees and toes: and it is more safe to ride with the ball of the foot pressing on the stirrup, than with the stirrup as far back as the heel; for the pressure of the heel being in that case behind the stirrup, keeps the thighs down.

When you find your thighs thrown upwards, widen your knees to get them and the upper part of your fork lower down on the horse. Grasp the saddle with the hollow or inner part of your thighs, but not more than just to assist the balance of your body: this will also enable you to keep your spurs from the horse's sides, and to bring your toes in, without that affected and

useless manner of bringing them in practised by many. Sink your heels straight down; for while your heels and thighs keep down, you cannot fall: this (aided with the bend of the back) gives the security of a seat, to those who bear themselves up in their stirrups in a swift gallop, or in the alternate rising and falling in a full trot.

Let your seat determine the length of your stirrups, rather than the stirrups your seat. If more precision is requisite, let your stirrups (in the hunting saddle) be of such a length, as that, when you stand in them, there may be the breadth of four fingers between your seat and the saddle.

It would greatly assist a learner, if he would practise riding in a large circle, as directed in sect. ii. without stirrups; keeping his face looking on the outward part of the circle so as not to have a full view of the horse's head, but just of that ear which is on the outward part of the circle; and his shoulder, which is towards the centre of the circle, very forward. By this means you learn to balance your body, and keep a true seat, independent of your stirrups: you may probably likewise escape a fall, should you at any time lose them by being accidentally shaken from your seat.

As the seat in some measure depends on the saddle, it may not be amiss to observe, that because a saddle with a high pommel is thought dangerous, the other extreme prevails, and the pommel is scarce allowed to be higher than the middle of the saddle. The saddle should lie as near the back-bone as can be, without hurting the horse; for the nearer you sit to his back, the better seat you have. If it does so, it is plain the pommel must rise enough to secure the withers from pressure: therefore, a horse whose withers are higher than common, requires a higher pommel. If, to avoid this, you make the saddle of a more straight line, the inconvenience spoken of follows; you sit too much above the horse's back, nor can the saddle form a proper seat. There should be no ridge from the button at the side of the pommel, to the back part of the saddle. That line also should be a little concave, for your thighs to lie at ease. In short, a saddle ought to be, as nearly as possible, as if cut out of the horse.

When you want your horse to move forward, raise his head a little, and touch him gently with your whip; or else, press the calves of your legs against his sides. If he does not move fast enough, press them with more force, and so till the spur just touches him. By this practice he will (if he has any spirit) move upon the least pressure of the leg. Never spur him by a kick; but if it be necessary to spur him briskly, keep your heels close to his sides, and slacken their force as he becomes obedient.

When your horse attempts to be vicious, take each rein separate, one in each hand, and advancing your arms forward, hold him very short. In this case, it is common for the rider to pull him hard, with his arms low. But the horse by this means having his head low too, has it more in his power to throw out his heels: whereas, if his head be raised very high, and his nose thrown out a little, which is consequent, he can neither rise before nor behind; because he can give himself neither of those motions, without having his head at liberty. A plank placed in *æquilibrio*, cannot rise at one end unless it sinks at the other.

If your horse is headstrong, pull not with one continued pull, but stop, and back him often, just shaking the reins, and making little repeated pulls till he obeys. Horses are so accustomed to bear on the bit when they go forward, that they are discouraged if the rider will not let them do so.

If a horse is loose necked, he will throw up his head at a continued pull; in which situation, the rider, seeing the front of his face, can have no power over him. When your horse does thus, drop your hand and give the bridle play, and he will

of course drop his head again into its proper place: while it is coming down, make a second gentle pull, and you will find his mouth. With a little practice, this is done almost instantaneously; and this method will stop, in the distance of a few yards, a horse, which will run away with those who pull at him with all their might. Almost every one must have observed, that when a horse feels himself pulled with the bridle, even when he is going gently, he often mistakes what was designed to stop him, as a direction to bear on the bit and to go faster.

Keep your horse's head high, that he may raise his neck and crest; play a little with the rein, and move the bit in his mouth, that he may not press on it in one constant and continued manner: be not afraid of raising his head too high; he will naturally be too ready to bring it down, and tire your arms with its weight, on the least abatement of his mettle. When you feel him heavy, stop him, and make him go back a few paces: thus you break by degrees his propensity to press on his bridle.

You ought not to be pleased (though many are) with a round neck, and a head drawn in towards his breast: let your horse carry his head bridling in, provided he carries it high, and his neck arching upwards; but if his neck bends downwards, his figure is bad, his sight is too near his toes, he leans on the bridle, and you have no command over him. If he goes pressing but lightly on the bridle, he is the more sure-footed, and goes pleasanter; as your wrist only may guide him. If he hangs down his head, and makes you support the weight of that and his neck with your arms bearing on his fore legs (which is called *being on his shoulders*), he will strike his toes against the ground, and stumble.

If your horse is heavy upon the bit, tie him every day, for an hour or two, with his tail to the manger, and his head as high as you can make him lift it, by a rein on each post of the stall, tied to each ring of the snaffle bit.

Horse-breakers and grooms have a great propensity to bring a horse's head *down*, and seem to have no seat without a strong hold by the bridle. They know indeed, that the head should yield to the reins, and the neck form an arch; but do not take the proper pains to make it an arch *upward*. A temporary effect of attempting to raise a horse's head, may perhaps be making him push out his nose. They will here tell you, that his head is too high already; whereas it is not the distance from his *nose*, but from the *top* of his head to the ground, which determines the head to be high or low. Besides, although the fault is said to be in the manner of carrying the head, it should rather be said to be in that of the neck; for if the neck was raised, the head would be more in the position of one set on a well formed neck.

The design therefore of lifting up the head, is to raise the neck, and *thereby* bring in the head; for even while the bridle makes the same line from the rider's hand to the bit, the horse's nose may be either drawn in, or thrust out, according as his neck is raised or depressed. Instead of what has been here recommended, we usually see colts broke with their heads caved down very low, their necks stiff, and not in the least suppled. When the breaking tackle is left off, and they are mounted for the road, having more food and rest, they frequently plunge, and a second breaking becomes necessary. Then, as few gentlemen can manage their own horses, they are put into the hands of grooms, from whom they learn a variety of bad habits.

If, on the other hand, your horse carries his head (or rather his nose) too high, he generally makes some amends by moving his shoulders lightly, and going safely. Attend to the cause of this fault. Some horses have their necks set so low on their shoulders, that they bend first down, then upwards, like a stag's. Some have the upper line of their necks, from their ears to their withers, too short. A head of this sort cannot possibly bend in-

wards and form an arch, because the vertebræ (or neck-bones) are too short to admit of flexure; for in long and short-necked horses the number of the vertebræ is the same. In some, the jaw is so thick, that it meets the neck, and the head by this means has not room to bend. On the other hand, some have the under line from the jaw to the breast so short, that the neck cannot rise.

In all these cases you may gain a *little* by a nice hand with an easy bit; but no curb, martingale, or other forcible method, will *teach* a horse to carry his head or neck in a posture which nature has made uneasy to him. By trying to pull in his nose farther than he can bear, you will add a bad habit to nature. You could not indeed *contrive* a more effectual method to make him continually toss his nose up, and throw his foam over you.

The rule already given to ride a loose-necked horse, will be a proper one for all light-mouthed horses: one caution being added, which is, always to search whether his saddle or girths may not in some way pinch him; and whether the bit may not hurt his lip by being too high in his mouth: because, whenever he frets from either of these causes, his head will not be steady.

It is a common custom to be always pulling at the bridle, as if to set off to advantage either the spirit of the horse, or the skill of the rider. Our horses therefore are taught to hold their heads low, and pull so as to bear up the rider from the saddle, standing in his stirrups, even in the gentlest gallop: how very improper this is, we are experimentally convinced, when we happen to meet with a horse which gallops otherwise: we immediately say, *he canters excellently*, and find the ease and pleasure of his motion. When horses are designed for the race, and swiftness is the only thing considered, the method may be a good one.

It is not to be wondered that *dealers* are always pulling at their horses; that they have the spur constantly in their sides, and are at the same time continually checking the rein: by this means they make them bound, and champ the bit, while their rage has the appearance of spirit. These people ride with their arms spread, and very low on the shoulders of their horses: this method makes them stretch their necks, and gives a better appearance to their forehands; it conceals also a thick jaw, which, if the head was up, would prevent its yielding to the bit; it hides likewise the ewe-neck, which would otherwise show itself. Indeed, if you have a horse unsteady to the bit, formed with a natural heavy head, or one which carries his nose obstinately in the air, you must find his mouth where you can, and make the best of him.

Many horses are taught to start by whipping them for starting. How is it possible they can know it is designed as a punishment? In the riding-house, you teach your horse to rise up before, and to spring and lash out his hinder legs, by whipping him when tied between two pillars, with his head a little at liberty. If he understood this to be a punishment for doing so, he would not by that method learn to do it. He seems to be in the same manner *taught* to spring and fly when he is frightened. Most horses would go quietly past an object they were beginning to fly from, if their riders, instead of gathering up their bridles, and showing themselves so ready, should throw the reins loose upon their necks.

When a horse starts at any thing on one side, most riders turn him out of the road, to make him go up to what he starts at: if he does not get the better of his fear, or readily comply, he generally goes past the object, making with his hinder parts, or croup, a great circle out of the road; whereas, he should learn to keep straight on, without minding objects on either side.

If he starts at any thing on the left, hold his head high, and keep it straight in the road, pulling it *from* looking at the

thing he starts at, and keeping your right leg hard pressed against his side, towards his flank: he will then go straight along the road. By this method, and by turning his head a little more, he may be forced with his croup close up to what frightened him; for, as his head is pulled one way, his croup necessarily turns the other. Always avoid a quarrel with your horse, if you can: if he is apt to start, you will find occasions enough to exercise his obedience, when what he starts at lies directly in his way, and you *must* make him pass; if he is not subject to start, you should not quarrel with him about a trifle.

It must be observed, however, that this rule in going past an object may perhaps be a little irregular in a managed horse, which will always obey the leg: but even such a horse, if he is really afraid, and not restive, it may not be amiss to make look another way; unless the object be something you would particularly accustom him to the sight of.

The case will also be different with a horse whose fear is owing to his not being used to objects; but such a one is not to be rode by any horseman to whom these rules are directed: the starting here meant arises merely from the horse's being panicked, and springing through liveliness.

The notion of the necessity of making a horse go immediately up to every thing he is afraid of, and not suffering him to become master of his rider, seems to be in general carried too far. It is an approved and good method to conquer a horse's fear of the sound of a drum, by beating one near to him at the time of feeding him: this not only familiarizes the noise to him, but makes it pleasant, as a fore-runner of his meat (see sect. v.); whereas, if he was whipped up to it, he might perhaps start at it as long as he lived. Might not this be applied to his starting at other things, and show that it would be better to suffer him (provided he does not turn back) to go a little from and avoid an object he has a dislike to, and to accustom him to it by degrees, convincing him, as it were, that it will not hurt him; than to punish him, quarrel with him, and perhaps submit to his will at last, while you insist on his overcoming his fear in an instant? If he sees a like object again, it is probable he will recollect his dread, and arm himself to be disobedient.

We are apt to suppose that a horse fears nothing so much as his rider: but may he not, in many circumstances, be afraid of instant destruction? of being crushed? of being drowned? of falling down a precipice? Is it a wonder that a horse should be afraid of a loaded waggon? may not the hanging load seem to threaten the falling on him? There cannot be a rule more general, than, in such a case, to show him there is room for him to pass. This is done by turning his head a very little from the carriage, and pressing your leg, which is farthest from it, against his side.

A horse is not to stop without a sign from his rider. Is it not then probable, that, when driven up to a carriage he starts at it, he conceives himself obliged either to attack or run against it? Can he understand the rider's spurring him with his face directed to it, as a sign for him to pass it? That a horse is easily alarmed for his face and eyes (he will even catch back his head from a hand going to caress him); that he will not go with any force, face to face, even to another horse (if in his power to stop); and that he sees perfectly sideways, may be useful hints for the treatment of horses with regard to starting.

Though you ought not to whip a horse for starting, there can be no good effect from clapping his neck with your hand to encourage him. If one took any notice of his starting, it should be rather with some tone of voice which he usually understood as an expression of dislike to what he is doing; for there is *apprehension* mixed with his starting, and a horse will ever repeat what he finds has foiled his rider.

Notwithstanding the directions above given, of not pressing a horse up to a carriage he starts at; yet if one which you appre-

end will frighten him meets you at a narrow part of the road, when you have once let him know he is to pass it, be sure you remain determined, and press him on. Do this more especially when part of the carriage has already passed you : for if, when he is frightened, he is accustomed to go back, and turn round, he will certainly do it if he finds, by your hand slackening, and legs not pressing, that you are irresolute ; and this at the most dangerous point of time, when the wheels of the carriage take him as he turns. Remember not to touch the curb rein at this time ; it will certainly check him. It is not known to every one, that the person who would lead a horse by the bridle, should not turn his face to him when he refuses to follow him : if, besides this, he raises his arms, shows his whip, or pulls the bridle with jerks, he frightens the horse, instead of persuading him to follow ; which a little patience may bring about.

Ride with a snaffle ; and use your curb, if you have one, only occasionally. Choose your snaffle full and thick in the mouth, especially at the ends to which the reins are fastened. Most of them are made too small and long ; they cut the horse's mouth, and bend back over the bars of his jaw, working like pinners.

The management of the curb is too nice a matter to enter on here, farther than to prescribe great caution in the use of it : a turn of the wrist, rather than the weight of your arm, should be applied to it. The elasticity of a rod, when it hath hooked a fish, may give you some idea of the proper play of a horse's head on his bridle ; his spirit and his pliability are both marked by it.

A horse should never be put to do any thing in a curb which he is not ready at : you may force him, or pull his head any way with a snaffle ; but a curb acts only in a straight line. It is true, that a horse will be turned out of one track into another by a curb, but it is because he knows it as a *signal*. When he is put to draw a chair, and does not understand the necessity he is then under of taking a larger sweep when he turns, you frequently see him *resist*, as it is then called : but put him on a snaffle, or buckle the rein to that part of the bit which does not curb him ; and the horse submits to be pulled about, till he understands what is desired of him. These directions suppose your horse to have spirit, and a good mouth : if he has not, you must take him as he is, and ride him with such a bit as you find most easy to yourself.

When you ride a journey, be not so attentive to your horse's nice carriage of himself, as to your encouragement of him, and keeping him in good humour. Raise his head ; but if he flags, you may indulge him with bearing a little more upon the bit than you would suffer in an airing. If a horse is lame, tender-footed, or tired, he naturally hangs upon his bridle. On a journey, therefore, his mouth will depend greatly on his strength and the goodness of his feet. Be then very careful about his feet, and let not a blacksmith spoil them, but attend to the directions given under the article FARRIERY, p. 442 and 450.

Even though practised in riding, very few persons know they have any power over a horse but by the bridle ; or any use for the spur, except to make him go forward. A little experience will teach them a farther use. If the left spur touches him (and he is at the same time prevented from going forward), he has a sign, which he will soon understand, to move sideways to the right. In the same manner to the left, if the right spur goads him. He afterwards, through fear of the spur, obeys a touch of the leg ; in the same manner as a horse moves his croup from one side of the stall to the other, when any one strikes him with his hand. In short, his croup is guided by the leg, as his head is by the bridle. He will never disobey the leg, unless he becomes restive. By this means you will have a far greater power over him : he will move sideways, if you close

one leg to him ; and straight forward, if both : even when he stands still, your legs held near him will keep him on the watch ; and with the slightest, unseen motion of the bridle upwards, he will raise his head, and show his forehead to advantage.

On this use of the legs of the rider, and guidance of the croup of the horse, are founded all the *airs* (as the riding-masters express themselves) which are taught in the manege ; the passage, or side-motion of troopers to close or open their files, and indeed all their evolutions. But the convenience of some degree of this discipline for common use is the reason of mentioning it here. It is useful if a horse is apt to stumble or start. If to the first, by pressing your legs to his flank, and keeping up his head, he is made to go light on his fore-legs, which is aiding and supporting him ; and the same if he does actually stumble, by helping him at the very instant to exert himself, while as yet any part of him remains not irrecoverably impressed with the precipitate motion. Hence this use of the hand and legs of the rider is called *giving aids* to a horse ; for, as to holding up the weight of a heavy inactive horse by mere pulling, it is as impossible as to recover him when falling down a precipice.

A horse is supported and helped by the hands and legs of his rider in every action they require of him ; hence he is said to perform his *airs* by the *aids* from his rider.

The same manner is useful if a horse starts. For if when he is beginning to fly to one side, you leg on the side he is flying to, he stops his spring immediately. He goes past what he started at, keeping straight on, or as you choose to direct him ; and he will not fly back from any thing if you press him with both legs. You keep his haunches under him going down a hill ; help him on the side of a bank ; more easily avoid the wheel of a carriage ; and approach more gracefully and nearer to the side of a coach or horseman. When a pampered horse carvets irregularly, and twists his body to and fro, turn his head either to the right or left, or both alternately (but without letting him move out of the track), and press your leg to the opposite side : your horse cannot then spring on his hind-legs to one side, because your leg prevents him ; nor to the other, because his head looks that way, and a horse does not start and spring to the side on which he looks. Here it may not be amiss to observe the impropriety of the habit which many riders have, of letting their legs shake against the sides of the horse : if a horse is taught, they are then continually pressing him to violent action ; and if he is not, they render him insensible and incapable of being taught. The fretting of a hot horse will hence be excessive, as it can no otherwise be moderated than by the utmost stillness of the seat, hands, and legs of the rider.

Colts at first are taught to *bear* a bit, and by degrees to *pull* at it. If they did not press it, they could not be guided by it. By degrees they find their necks stronger than the arms of a man ; and that they are capable of making great opposition, and often of foiling their riders. Then is the time to make them supple and pliant in every part. The part which of all others requires most this pliancy is the neck. Hence the metaphor of *stiff-necked* for *disobedient*. A horse cannot move his head but with the muscles of his neck : this may be called his *helm* ; it guides his course, changes and directs his motion.

The use of this pliancy in the different parts and limbs of a horse has been already shown in a former section. The present section being directed to the *unexperienced* horseman, it may suffice to add, that his idea of suppleness need only be, that of an ability and readiness in a horse to move every limb, on a sign given him by the hands or legs of his rider ; as also to bend his body, and move in a short compass, quick and collected within himself, so as instantly to be able to perform any other motion.

HORSHAM, a town of Suffex, seated near St. Leonard's forest, 38 miles from London. It has its name from Horfa, brother to Hengist the Saxon; and is one of the largest towns in the county. It has sent members to parliament ever since the 30th of Edward I. and is the place where the county gaol is held, and often the assizes. It is a borough by prescription, with the title of two bailiffs and burgrave-holders within and without the borough, &c. who elect the members of parliament, and they are returned by the bailiffs chosen yearly by a court-leet of the lord of the manor, who return four candidates to the steward, and he nominates two of them for the office. Here is a very fine church, and a well endowed free-school. Great store of poultry is bought up for London at its market on Saturday, and it has a patent also for a monthly market.

HORSTIUS (JAMES), professor of medicine in the university of Helmstadt, in the 16th century. He joined devotion with the knowledge and practice of physic. He carefully prayed to God to bless his prescriptions, and published a form of prayer upon this subject. He also wrote, 1. A Treatise on the Qualities of a good Physician. 2. Another on the Qualities of a good Apothecary. 3. A Treatise of the Plague, in German. 4. A Commentary in *Libros Hippocratis de Corde*, and other works.

HORSTIUS (Gregory), nephew of the former, called *the Æsculapius of Germany*, published several books, which are esteemed.

HORTAGILERS, in the grand signior's court, upholsters, or tapestry hangers. The grand signior has constantly 400 in his retinue when he is in the camp: these go always a day's journey before him, to fix upon a proper place for his tent, which they prepare first; and afterwards those of the officers, according to their rank.

HORTENSIUS (QUINTUS), a celebrated Roman orator, the cotemporary of Cicero, pleaded with universal applause at 19 years of age, and continued the same profession during 48 years. But being at last eclipsed by Cicero, he quitted the bar, and embraced a military life; became a military tribune, prætor, and afterwards consul, about 70 B. C. Cicero speaks of him in such a manner as makes us regret the loss of his orations. Hortensius had a wonderful memory, and delivered his orations without writing down a single word, or forgetting one particular that had been advanced by his adversaries. He died very rich, a little before the civil war, which he had endeavoured by all possible means to prevent.

HORTUS SICCUS, a DRY GARDEN; an appellation given to a collection of specimens of plants carefully dried and preserved. The value of such a collection is very evident, since a thousand minutæ may be preserved in the well dried specimens of plants, which the most accurate engraver would overlook. We shall therefore give two methods of drying and preserving a *hortus siccus*: the first by Sir Robert Southwell in the *Philosophical Transactions*, N^o 237; and the other by Dr. Hill, in his review of the works of the Royal Society, with his objections to Sir Robert's method.

According to the former gentleman, the plants are to be laid flat between papers, and then put between two smooth plates of iron, screwed together at the corners; and in this condition committed to a baker's oven for two hours. When taken out, they are to be rubbed over with a mixture of equal parts of aquafortis and brandy; and after this to be fastened down on paper with a solution of the quantity of a walnut of gum tragacanth dissolved in a pint of water. See **HIERBAL**. To this the Doctor objects, that the heat of an oven is much too uncertain to be employed in so nice an operation; and that the space of time ordered for continuing the plants in it is of no information, unless the degree of heat, and even the different nature of the plant as to its succu-

lency and the firmness or tenderness of its fibres, be attended to; there being scarcely any two plants alike in these particulars: consequently the degree and duration of heat sufficient for one plant would destroy another. Beside which, the acid used destroys the colour of many plants; and never recovers that of others lost in the drying; and frequently, after the plant is fixed down, rots both the paper it is fixed to, and that which falls over it. Dr. Hill's method is as follows: Take a specimen of a plant in flower, and with it one of its bottom leaves if it have any; bruise the stalk if too rigid, or slit it if too thick: spread out the leaves and flowers on paper, cover it with more paper, and lay a weight over all. At the end of 18 hours take out the plants, now perfectly flattened, and lay them on a bed of dry common sand; sift more dry sand over them to the depth of two inches, and thus let them lie about three weeks: the less succulent dry much sooner, but they take no harm afterward. If the floor of a garret be covered in spring with sand two inches deep, leaving space for walking to the several parts, it will receive the collection of a whole summer; the covering of sand being sifted over every parcel as laid in, they need no farther care from the time of laying them till they are taken up to be stuck on paper. The cement used by the Doctor is thus prepared: Early in the spring, put two ounces of camphor into three quarts of water in a large bottle, shake it from time to time; and when the first collected plants are ready for the fastening down, put into a pint of the water, poured off into an earthen vessel that will bear the fire, two ounces of common glue, such as is used by the carpenters, and the same quantity of ichthyocolla beat to shreds; let them stand 36 hours, then gently boil the whole a few moments, and strain it off through a coarse cloth: this is to be warmed over a gentle heat when it is to be used, and the back of the plants smeared over with a painter's brush: after this lay them on paper, and gently press them for a few minutes, then expose them to the air a little; and finally, lay them under a small weight between quires of paper to be perfectly dried.

It is scarce to be conceived how strongly the water becomes impregnated with the camphor, by this simple process: a part of it indeed flies off in the making of the cement and the using of it: but enough remains with the plants to prevent the breeding of insects in it. He farther observes, that plants may be dried very well without sand, by only putting them frequently into fresh quires of paper, or a few, by only pressing them between the leaves of a book: but the sand method preserves the colour best, and is done with least trouble.

Another method much better than that of the oven is the flattening and drying the plant by passing a common smoothing iron for linen over the papers between which it is laid: but for nice things the most perfect of all methods is that by a common sand heat, such as is used for chemical purposes. The cold sand is to be spread smooth upon this occasion, the plant laid on it carefully flatted, and a thick bed of sand sifted over: the fire is then to be made, and the whole process carefully watched until by a very gentle heat the plant be carefully dried. The colour of the tenderest herb may by this manner be preserved; and flowers that can no way else be preserved, may be managed perfectly well thus.

HORUS, a renowned deity of ancient Egypt. He was an emblem of the sun. Plutarch, in his treatise *de Iside et Osiride*, says, "that virtue which presides over the sun, whilst he is moving through space, the Egyptians called *Horus*, and the Greeks *Apollon*." Job also calls *Ur* or *Orus* the sun—"If I gazed upon the sun (*Ur*, *Orus*) when he was shining, or on the moon (*Iarêcha*) walking in brightness, and my heart hath been severely enticed (*i. e.* to worship), or my mouth hath

kissed my hand; this also were an iniquity to be punished by the judge, for I should have denied the God who is above." Chap. xxxi. ver. 26, 27, 28.

The interpretation left by Hierapion of the hieroglyphics engraved on the obelisk of Heliopolis (according to Ammianus Marellinus), offers these remarkable words: "Horus is the supreme lord and author of time." These qualities, it is known, were chiefly attributed to Osiris: that they may apply, therefore, to Horus, he must necessarily denote the star of the day in certain circumstances; and this is what is explained to us by the oracle of Apollo of Claros: "*Learn that the first of the gods is Jao. He is called invisible in winter, Jupiter in the spring, the Sun in summer, and towards the end of autumn the tender Jao.*" The star of the day, on attaining the summer solstice, and called *per excellentiam* "The Sun," is the same as Horus. In fact, the Egyptians represented him borne on lions, which signified his entrance into the sign of the lion. They who presided over the divine institutions, then placed sphynxes at the head of the canals and sacred fountains, to warn the people of the approaching inundation. Macrobius (*Saturnal.* lib. i.), who informs us why the Greeks gave Horus the name of Apollo, confirms this sentiment: "In the mysteries," says he, "they discover as a secret, which ought to be inviolable, that the sun arrived in the upper hemisphere is called Apollo." These testimonies concur in proving, that this emblematical deity was no other than the star of day passing through the signs of summer.

These lights may lead us to the explication of the sacred fable, which the priests published on the subject of Horus; for they enveloped in mystery every point of their religion. Plutarch gives it at length in his treatise of Isis and Osiris: The following are the principal traits. They said that he was the son of Osiris and of Isis; that Typhon, after killing his brother Osiris, took possession of the kingdom; that Horus, leaguering himself with Isis, avenged the death of his father, expelled the tyrant from his throne without depriving him of life, and reigned gloriously in Egypt. A person who has travelled ever so little in Egypt, easily discovers natural phenomena hid under the veil of fable. In the spring, the wind khamsin frequently makes great ravages there. It raises whirlwinds of burning sands, which suffocate travellers, darken the air, and cover the face of the sun in such a manner as to leave the earth in perfect obscurity. Here is the death of Osiris and the reign of Typhon. These hurricanes break loose usually in the months of February, March, and April. When the sun approaches the sign of the lion, he changes the state of the atmosphere, disperses these tempests, and restores the northerly winds, which drive before them the malignant vapours, and preserve in Egypt coolness and salubrity under a burning sky. This is the triumph of Horus over Typhon, and his glorious reign. As the natural philosophers acknowledge the influence of the moon over the state of the atmosphere, they united her with this god, to drive the usurper from the throne. The priests, considering Osiris as the father of time, might bestow the name of his son on Horus, who reigned three months in the year. This, according to Mr. Savary (*Letters on Egypt*, ii. 403.), is the natural explication of this allegory. And all enlightened men, he thinks, must have understood this language, which was familiar to them. The people only, whose feeble sight extends no farther than the exterior, without diving into the true meaning of things, might regard these allegorical personages as real gods, and decree prayers and offerings to them.

Jablonski, who has interpreted the epithet of Arueri, which the Egyptians gave to Horus, pretends that it signifies *effica-*

cious virtue. These expressions perfectly characterise the phenomena which happened during the reign of this god. It is in summer, in fact, that the sun manifests all its power in Egypt. It is then that he swells the waters of the river with rains, exhaled by him in the air, and driven against the summits of the Abyssinian mountains; it is then that the husbandman reckons on the treasures of agriculture. It was natural for them to honour him with the name of *Arueri*, or *efficacious virtue*, to mark these auspicious effects.

HOSANNA, in the Hebrew ceremonies, a prayer which they rehearsed on the several days of the feast of tabernacles. It was thus called, because there was frequent repetition therein of the word *הושיענו*, *serva nunc*; or *serva, precor*; i. e. save us now; or, save us, we pray. There are many of these hosannahs. The Jews call them *hoschannoth*; i. e. the *hosannahs*. Some are rehearsed on the first day, others on the second, &c. which they call *hosanna* of the first day, *hosanna* of the second day, &c.

HOSANNA *Rabba*, or *Grand Hosanna*, is a name they give to their feast of tabernacles, which lasts eight days; because, during the course thereof, they are frequently calling for the assistance of God, the forgiveness of their sins, and his blessing on the new year; and to that purpose they make great use of the hoschannoth, or prayers above mentioned. The Jews also apply the term *hosanna rabba*, in a more peculiar manner, to the seventh day of the feast of tabernacles; because they apply themselves more immediately on that day to invoke the divine blessing, &c.

HOSCHIUS (SIDRONIUS), a jesuit, who was born at Marke, in the diocese of Ypres, in 1596, and died at Tongres in 1653. He wrote some elegies and other poems in Latin with great purity and elegance.

HOSE, from the Saxon *hosa*, a stocking. See STOCKING.

HOSEA, a canonical book of the Old Testament, so called from the prophet of that name, its author, who was the son of Beri, and the first of the lesser prophets. He lived in the kingdom of Samaria, and delivered his prophecies under the reign of Jeroboam II. and his successors, kings of Israel; and under the reigns of Uzziah, Jotham, Ahaz, and Hezekiah, kings of Judah. His principal design is to publish the gross idolatries of the people of Israel and Judah, to denounce the divine vengeance against them, and to foretel the captivity in Assyria.

HOSPINIAN (RODOLPHUS), one of the greatest writers that Switzerland has given birth to. He was born in 1547, at Altorf near Zurich; obtained the freedom of Zurich; and was made provisor of the abbey school. Notwithstanding this employment, he undertook a noble work of vast extent, which was a *History of the Errors of Popery*. Though he could not complete this work according to his plan, he published some considerable parts of it: what he published on the Eucharist, and another work called *Concordia Discors*, exceedingly exasperated the Lutherans. He did not reply to them; but, turning his arms against the Jesuits, published *Historia Jesuitica*, &c. These writings gained him preferment; he being appointed archdeacon of Caroline church, and then minister of the abbey church. He died in 1626; and there was an edition of his works published at Geneva 1681, in seven volumes in folio.

HOSPITAL, popularly SPITAL, a place or building erected, out of charity, for the reception and support of the poor, aged, infirm, sick, and otherwise helpless. The word is formed of the Latin *hospes*, host, stranger." See HOST. In the ages of the church, the bishop had the immediate charge of all the poor, both sound and diseased, as also of

widows, orphans, strangers, &c. When the churches came to have fixed revenues allotted them, it was decreed, that at least one fourth part thereof should go to the relief of the poor; and to provide for them the more commodiously, many houses of charity were built, which are since denominated *hospitals*. They were governed wholly by the priests and deacons, under the inspection of the bishop. In course of time, separate revenues were assigned for the hospitals; and particular persons, out of motives of piety and charity, gave lands and money for erecting of hospitals. When the church discipline began to relax, the priests, who till then had been the administrators of hospitals, converted them into a sort of benefices, which they held at pleasure, without giving account thereof to any body; reserving the greatest part of the income to their own use; so that the intentions of the founders were frustrated. To remove this abuse, the council of Vienne expressly prohibited the giving any hospital to secular priests in the way of a benefice; and directed the administration thereof to be given to sufficient and responsible laymen, who should take an oath, like that of tutors, for the faithful discharge thereof, and be accountable to the ordinaries. This decree was executed and confirmed by the council of Trent.

In Britain, hospitals are buildings properly endowed, or otherwise supported by charitable contributions, for the reception and support of the poor, aged, infirm, sick, or helpless. A charitable foundation laid thus for the sustenance and relief of the poor, is to continue for ever. Any person seized of an estate in fee, may, by deed enrolled in chancery, erect and found an hospital, and nominate such heads and governors therein as he shall think fit; and this charitable foundation shall be incorporated, and subject to the inspection and guidance of the heads and visitors nominated by the founder. Likewise such corporations shall have, take, and purchase lands, so as not to exceed 200l. a year, provided the same be not held of the king; and to make leases, reserving the accustomed yearly rent. See CORPORATION.

HOSPITAL (MICHAEL DE L'), chancellor of France in the 16th century, was one of the greatest men of his age, and had raised himself by degrees. He agreed to an edict much severer against the Protestants than he could have wished, to prevent the introduction of the Inquisition. It was that of Romorantin. The speeches he made, in order to inspire a spirit of toleration, made him much suspected by the Roman Catholics, and extremely odious to the court of Rome. The maxims of state upon which he regulated himself were of great advantage to France, since he formed some disciples who opposed, in proper time, the pernicious attempts of the leaguers, and rendered them abortive. His pacific views being disliked by Catharine de Medicis, who had contributed to his advancement, she excluded him from the council of war, and occasioned his disgrace. He retired, however, of his own accord, in 1568; and spent the rest of his life at his country-seat at Vignai, where he died in 1573, aged 68. His poems are esteemed. He also published some excellent speeches and memoirs.

HOSPITAL (William-Francis Antony, marquis of), a great mathematician of France, was born of an ancient family in 1661. He was a geometrician almost from his infancy; for one day being at the duke of Rohan's, where some able mathematicians were speaking of a problem of Pascal's which appeared to them extremely difficult, he ventured to say that he believed he could solve it. They were amazed at such presumption in a boy of 15, for he was then no more; nevertheless, in a few days he sent them the solution. He entered early into the army, and was a captain of horse; but being extremely short-sighted, and exposed on that account to perpetual inconveniences and errors, he at length quitted the

army, and applied himself entirely to his favourite amusement. He contracted a friendship with Malbranche, and took his opinion upon all occasions. In 1693 he was received an honorary member of the academy of sciences at Paris; and he published a work upon Sir Isaac Newton's calculations, intitled, *L'Analyse des infinimens petits*. He was the first in France who wrote upon this subject; and on this account was regarded almost as a prodigy. He engaged afterwards in another work of the mathematical kind, in which he included *Les Sections Coniques, les Lieux Geometriques, la Construction des Equations, et Une Theorie des Courbes Mechaniques*: but a little before he had finished it, he was seized with a fever, of which he died Feb. 2, 1704, aged 43. It was published after his death.

HOSPITALITY, the practice of entertaining strangers. Dr. Robertson, speaking of the middle ages, says, "Among people whose manners are simple, and who are seldom visited by strangers, hospitality is a virtue of the first rank. This duty of hospitality was so necessary in that state of society which took place during the middle ages, that it was not considered as one of those virtues which men may practise or not, according to the temper of their minds and the generosity of their hearts. Hospitality was enforced by statutes, and those who neglected the duty were liable to punishment. The laws of the Slavi ordained that the moveables of an inhospitable person should be confiscated, and his house burnt. They were even so solicitous for the entertainment of strangers, that they permitted the landlord to steal for the support of his guest."

The hospitality of our British ancestors, particularly of the great and opulent barons, hath been much admired. Their castles were capacious palaces, daily crowded with their numerous retainers, who were always welcome to their plentiful tables. They had their privy counsellors, their treasurers, marshals, constables, stewards, secretaries, chaplains, heralds, pursuivants, pages, henchmen or guards, trumpeters, minstrels, and in a word all the officers of a royal court. The etiquette of their families was an exact copy of that of the royal household; and some of them lived in a degree of pomp and splendour little inferior to that of the greatest kings. Richard Neville, earl of Warwick, we are told, "was ever had in great favour of the commons of the land, because of the exceeding household which he daily kept in all countries wherever he sojourned or lay: and when he came to London, he held such an house, that six oxen were eaten at a breakfast; and every tavern was full of his meat." The earls of Douglas in Scotland, before the fall of that great family, rivalled or rather exceeded their sovereigns in pomp and profuse hospitality. But to this manner of living, it is highly probable, these great chieftains were prompted by a desire of increasing the number and attachment of their retainers, on which, in those turbulent times, their dignity, and even their safety, depended, rather than to the innate generosity of their tempers. Those retainers did not constantly reside in the families of their lords; but they wore their liveries and badges, frequently feasted in their halls, swelled their retinues on all great solemnities, attended them in their journeys, and followed them into the field of battle. Some powerful chieftains had so great a number of these retainers constantly at their command, that they set the laws at defiance, were formidable to their sovereigns, and terrible to their fellow-subjects; and several laws were made against giving and receiving liveries. But these laws produced little effect at that period of time.

Hospitality was not confined to the great and opulent, but was practised much more than it is at present by persons in the middle and lower ranks of life. But this was owing to necessity, arising from the scarcity of inns, which obliged travellers and strangers to apply to private persons for lodging and

entertainment; and those who received them hospitably acquired a right to a similar reception. This was evidently the case in Scotland in the first part of this period. James I. A. D. 1424, procured the following act of parliament: "It is ordanit, That in all burrow townis, and throughfairis quhair commoun passages ar, that thair be ordanit hostillaries and refectis, havand stables and chalmers; and that men find with thame bread and aill, and all uther fude, alsweil for horse as men, for resonable price." But travellers had been so long accustomed to lodge in private houses, that these public inns were quite neglected; and those who kept them presented a petition to parliament, complaining, "That the liegis travel-land in the realme, quhen they come to burrowis and throughfairis, herbreis thame not in hostillaries, bot with thair acquaintance and friendis." This produced an act prohibiting travellers to lodge in private houses where there were hostalries, under the penalty of 40s. and subjecting those who lodged them to the same penalty.

HOSPITALLERS, **HOSPITALARI**, an order of religious knights, who built an hospital at Jerusalem, wherein pilgrims were received. To these pope Clement V. transferred the effects and revenues of the Templars; whom, by a council held at Vienne, he suppressed for their many and great misdemeanours. These hospitallers were otherwise called *Knights of St. John of Jerusalem*; and are the same with those whom we now call *Knights of Malta*.

HOSPITIUM, a term used in old writers either for an inn or a monastery, built for the reception of strangers and travellers. See **INN** and **MONASTERY**.

HOSPODAR, a title borne by the princes of Walachia and Moldavia, who receive the investiture of their principalities from the grand signior. He gives them a vest and standard; they are under his protection, and obliged to serve him, and he even sometimes deposes them; but in other respects they are absolute sovereigns within their own dominions.

HOST, **HOSPES**, a term of mutual relation, applied both to a person who lodges and entertains another, and to the person thus lodged, &c. The word is formed of the Latin *hospes*, which some will have thus called, *quasi hospitium* or *ostium petens*; for *ostium* was anciently written with an aspirate. Thus the inn-keeper says, he has a good *host*, in speaking of the traveller who lodges with him: and the traveller again says, he has a kind *host*, in speaking of his landlord. It must be observed then, that it was the custom among the ancients, when any stranger asked for lodging, for the master of the house, and the stranger, each of them to set a foot on their own side of the threshold, and swear they would neither of them do any harm to the other. It was this ceremony that raised so much horror against those who violated the law or right of hospitality on either side; inasmuch as they were looked on as perjured. Instead of *hospes*, the ancient Latins called it *hostis*; as Cicero himself informs us: though, in course of time, *hostis* came to signify an enemy; so much was the notion of hospitality altered.

HOST is also used by way of abbreviation for *hostia*, a victim or sacrifice offered to the Deity. In this sense, *host* is more immediately understood of the person of the Word incarnate, who was offered up an host or *hostia* to the Father on the cross for the sins of mankind. See **HOSTIA**.

HOST, in the church of Rome, a name given to the elements used in the eucharist, or rather to the consecrated wafer, which they pretend to offer up every day as a new host or sacrifice for the sins of mankind. They pay adoration to the host, upon a false presumption that the elements are no longer bread and wine, but transubstantiated into the real body and blood of Christ. See **TRANSUBSTANTIATION**. Pope Gregory IX. first decreed a bell to be rung, as the signal for the people to

betake themselves to the adoration of the host. The vessel wherein the hosts are kept is called the *cibory*; being a large kind of covered chalice.

HOSTAGE, a person given up to an enemy as a security for the performance of the articles of a treaty.

HOSTIA, **HOST**, in antiquity, a victim offered in sacrifice to a deity. The word is formed from *hostis*, "enemy;" it being customary to offer up a sacrifice before they joined battle, to render the gods propitious; or, after the battle was over, to give them thanks. Some choose to derive the word from *hostio*, q. d. *ferio*, "I strike." Isidore on this word remarks, that the name *hostia* was given to those sacrifices which they offered before they marched to attack an enemy, (*antequam ad hostem pergerent*); in contradistinction from *victimæ*, which were properly those offered after the victory.

Hostia also signified the lesser sorts of sacrifice, and *victimæ* the larger. A. Gellius says, that every priest, indifferently, might sacrifice the *hostia*, but that the *victimæ* could be offered by none but the conqueror himself. But, after all, we find these two words promiscuously used one for the other by ancient writers. We read of many kinds of *hostiæ*: as *hostiæ puræ*, which were pigs or lambs ten days old; *hostiæ prævidanæ*, sacrifices offered the day before a solemn feast; *hostiæ bidentes*, sacrifices of sheep or other animals of two years old; *hostiæ esimæ*, a sacrifice of the flower of the flock; *hostiæ succedanæ*, sacrifices offered after others which had exhibited some ill omen; *hostiæ ambarvales*, victims sacrificed after having been solemnly led round the fields at the *ambarvalia*; *hostiæ amburbiales*, victims slain after the *amburbium*; *hostiæ canearæ* or *caviaræ*, victims sacrificed every fifth year by the college of pontiffs, in which they offered the part of the tail called *caviar*; *hostiæ prodigiæ*, sacrifices in which the fire consumed all, and left nothing for the priests; *hostiæ piaculares*, expiatory sacrifices; *hostiæ ambegnæ* or *ambignæ*, sacrifices of cows or sheep that had brought forth twins; *hostiæ harugæ*, victims offered to predict future events from; *hostiæ mediales*, black victims offered at noon.

HOT-BEDS, in gardening, beds made with fresh horse-dung, or tanner's bark, and covered with glasses to defend them from cold winds. By the skilful management of hot-beds, we may imitate the temperature of warmer climates; by which means, the seeds of plants brought from any of the countries within the torrid zone may be made to flourish even under the poles.

The hot-beds commonly used in kitchen-gardens, are made with new horse-dung mixed with the litter of a stable, and a few sea-coal-ashes, which last are of service in continuing the heat of the dung. This should remain six or seven days in a heap; and being then turned over, and the parts mixed well together, it should be again cast into a heap; where it may continue five or six days longer, by which time it will have acquired a due heat. These hot-beds are made in the following manner: In some sheltered part of the garden, dig out a trench of a length and width proportionable to the frames you intend it for; and if the ground be dry, about a foot or a foot and a half deep: but if it be wet, not above six inches: then wheel the dung into the opening, observing to stir every part of it with a fork, and to lay it exactly even and smooth on every part of the bed, laying the bottom part of the heap, which is commonly free from litter, upon the surface of the bed: and if it be designed for a bed to plant out cucumbers to remain for good, you must make a hole in the middle of the place designed for each light about ten inches over, and six deep, which should be filled with good fresh earth, thrusting in a stick to show the places where the holes are; then cover the bed all over with the earth that was taken out of the trench, about four inches thick, and put on the frame, letting it remain till the earth be warm, which commonly happens in

three or four days after the bed is made, and then the plants may be placed in it. But if your hot-bed be designed for other plants, there need be no holes made in the dung; but after having smoothed the surface with a spade, you should cover the dung about three or four inches thick with good earth, putting on the frames and glasses as before. In making these beds, care must be taken to settle the dung close with a fork; and if it be pretty full of long litter, it should be trod down equally on every part. During the first week or ten days after the bed is made, you should cover the glasses but slightly in the night, and in the day time carefully raise them, to let out the steam: but as the heat abates, the covering should be increased; and as the bed grows cold, new hot dung should be added round the sides of it.

The hot-bed made with tanner's bark is, however, much preferable to that described above, especially for all tender exotic plants and fruits, which require an even degree of warmth to be continued for several months, which cannot be effected with horse-dung. The manner of making them is as follows: Dig a trench about three feet deep, if the ground be dry; but if wet, it must not be above a foot deep at most, and must be raised two feet above the ground. The length must be proportioned to the frames intended to cover it; but it should never be less than ten or twelve feet, and the width not less than six. The trench should be bricked up round the sides to the abovementioned height of three feet, and filled in the spring with fresh tanner's bark that has been lately drawn out of their vats, and has lain in a round heap, for the moisture to drain out of it, only three or four days: as it is put in, gently beat it down equally with a dung-fork; but it must not be trodden, which would prevent its heating, by settling it too close: then put on the frame, covering it with glasses; and in about ten days or a fortnight it will begin to heat; at which time plunge your pots of plants or seed into it, observing not to tread down the bark in doing it. These beds will continue three or four months in a good temper of heat; and if you stir up the bark pretty deep, and mix a load or two of fresh bark with the old when you find the warmth decline, you will preserve its heat two or three months longer. Many lay some hot horse-dung in the bottom of the trench under the bark; but this ought never to be practised unless the bed is wanted sooner than the bark would heat of itself, and even then there ought only to be a small quantity of dung at the bottom.

The frames which cover these beds, should be proportioned to the several plants they are designed to contain. If they are to cover the ananas or pine-apple, the back part should be three feet high, and the lower part 15 inches: if the bed be intended for taller plants, the frame must be made of a depth proportionable to them: but if it be for sowing of seeds, the frame need not be above 14 inches high at the back, and 7 in the front; by which means the heat will be much greater.

HOT-HOUSE. See STOVE and HYPOCAUSTUM.

HOTEL, a French term, anciently signifying a house or dwelling-place; afterwards used for the palaces or houses of the king, princes, and great lords. In this sense they had the *hotel de Condé*, *hotel de Conti*, *hotel de Louvre*, &c. Since the abolition of monarchy, however, this term has been more commonly applied to public buildings, hospitals, &c. In England, the word *Hotel* signifies a large inn or temporary lodging-house ready furnished.

HOTMAN (FRANCIS), one of the most learned civilians in the 16th century. He professed law at Bourges; but, on account of religion, retired to Geneva, read lectures on civil law there, and published books with so much effect against the persecutors, that great promises were made to him to engage him not to write any more in that manner; but he did not regard their offers. He died at Basil in 1590. His *Franco-*

Gallia is well known, having been done in English by lord Molesworth. Some persons think he was the author of *Vindiciae contra Tyrannos*. All his works were printed at Geneva in 1590, in 3 vols folio.

HOTTENTOTS, a people in the southern part of Africa, whose country surrounds the empire of Monomotapa, in form of a horse-shoe, extending, according to Magin, from the Negroest of Cabo as far as the Cape of Good Hope; and from thence northward to the river Magnica, or Rio de St. Spiritus, including Mattatan a distinct kingdom. According to Sanutus, this coast, beginning at the Mountains of the Moon under the tropic of Capricorn in $23\frac{1}{2}^{\circ}$ S. lat. extends north beyond the Cape to the coast of Zanguebar; having the Indian sea on the east, the Ethiopic on the west, the southern ocean on the south; and on the north the kingdoms of Mattatan, Monomotapa, and the coast of Zanguebar, or rather the Mountains of the Moon, which divide it from the rest of the continent.

The Europeans first became acquainted with this country in the year 1493, when Bartholomew Diaz, a Portuguese admiral, discovered the most southerly point of Africa now called the *Cape of Good Hope*, but by him *Cabo dos tocos tormentos*, or Cape of all Plagues, on account of the storms he met with in the neighbourhood; but John, then king of Portugal, having from the account of Diaz concluded that a passage to the East Indies was now discovered, changed the name to that of the *Cape of Good Hope*, which it still retains. In 1497 it was circumnavigated by Gasco de Gama, who made a voyage to India that way: however, it remained useless to Europeans till the year 1650, when Van Riebeck a Dutch surgeon first saw the advantages that would accrue to the East India company in Holland from a settlement at such a convenient distance both from home and from India. The colony which he planted has till lately continued in the hands of the Dutch, has greatly increased in value, and is visited by all the European ships trading to the East Indies. See *GOOD-HOPE*.

The country, now possessed by the British, is of pretty considerable extent, and comprehends that part of the African coast on the west called *Terra de Natal*. It is naturally barren and mountainous; but the industry of its former possessors overcame all natural difficulties, and it now produces not only a sufficiency of all the necessaries of life for the inhabitants, but also for the refreshment of all the Europeans who pass and repass that way.

The coast abounds in capes, bays, and roads. Thirty leagues to the east of the Cape of Good Hope, in S. lat. $34. 21$. is another Cape which runs out beyond 35° , called by the Portuguese, who first doubled it, *Cabo dos Agulhas*, or the *Cape of Needles*, on account of some strange variations in the magnetical needle observed as they came near it. Near this Cape is a flat shore, with plenty of fish: it begins in the west near a fresh-water river, and, extending 15 leagues in the main sea, ends in the east near *Fish-bay*. Cabo Falso, so called by the Portuguese, who returning from India mistook it for the Cape of Good Hope, lies to the eastward between these two capes, about eight or nine leagues beyond that of Good Hope. Along the coasts, on both sides of the Cape of Good Hope, are many fine bays. Twenty-seven leagues to the north-west is Saldanha Bay, so named from a Portuguese captain shipwrecked on the coast. The largest and most commodious is *Table Bay*, on the south, and near the mountain of that name, six leagues in circumference, with four fathom water close to the beach. Opposite to this bay is *Robu Eilan*, or the Island of Rabbits, in $34. 30$. S. lat. 67 leagues east from the Cape of Good Hope. Peter Both, in 1651, discovered a bay, which he named *Uelß*, sheltered only from north winds, in which is a small island, and on the west a rivulet of fresh water extremely convenient for European mariners. Twenty-five or thirty leagues farther

east, Both discovered Marhal Bay, afterwards named by the Portuguese *Seno Formoso*. Next to this is *Seno de Lago*, from its resemblance to a lake. There are several roads in this bay, and an island called *Ilha dos Caos*. Cabo de S. Francisco and Cabo das Serras are marked upon charts between these two bays. Near the latter of these capes is Cabo de Arecito, and the island Contento; and something more north-east is St. Christopher's river, called *Sau Christovano* by the Portuguese, and by the Hottentots *Nagod*. The country beyond this river was called by the Portuguese, who discovered it on the day of our Lord's nativity, *Terra de Natal*. Between the Cape of Good Hope and Cabo das Agulhas are the Sweet, Salt, and Jagulina rivers, which run into the sea, and Sweet-water river flows from the Table-mountain.

The most remarkable mountains in this country are, Table-mountain, Devil's Tower, Lion's Head, and the Tiger-hills. The three first lie near Table-bay and surround Table-valley, where the Cape-town stands. (See the article *Good-Hope*.) Mr. Forster, in his voyage, informs us, that "the extremity of Africa towards the south is a mass of high mountains, of which the outermost are craggy, black, and barren, consisting of a coarse granite, which contains no heterogeneous parts, such as petrified shells, &c. nor any volcanic productions. The ground gradually rises on all sides towards the three mountains which lie round the bottom of the bay, keeping low and level only near the sea-side, and growing somewhat marshy in the Isthmus between False and Table Bays, where a salt rivulet falls into the latter. The marshy part has some verdure, but intermixed with a great deal of sand. The higher grounds, which, from the sea-side, have a parched and dreary appearance, are, however, covered with an immense variety of plants, among which are a prodigious number of shrubs, but scarce one or two species that deserve the name of *trees*. There are also a few small plantations wherever a little run of water moistens the ground. The ascent of Table-mount is very steep and difficult, on account of the number of loose stones which roll away under the feet of the traveller. About the middle of the mountain is a bold, grand chasm, whose walls are perpendicular, and often impending rocks piled up in strata. Small rills of water ooze out of crevices, or fall from precipices in drops, giving life to hundreds of plants and low shrubs in the chasm. The summit of the mountain is nearly level, very barren, and bare of soil; several cavities, however, are filled with rain water, or contain a small quantity of vegetable earth, from whence a few odoriferous plants draw their nourishment. Some antelopes, howling baboons, solitary vultures, and toads, are sometimes to be met with on the mountain. The view from thence is very extensive and picturesque. The bay seems a small pond or basin, and the ships in it dwindled to little boats; the town under our feet, and the regular compartments of its gardens, look like the work of children."

Most accounts of this country that have been published, mention a surprising phenomenon which is annually to be seen on the top of Table-hill from September to March; namely, a white cloud hovering on its top, and called by sailors, from its extensive flat surface, *the Devil's table-cloth*. This cloud is said by some to appear at first no bigger than a barley-corn; then increases to the size of a walnut, and soon after covers the whole top of the mount. But, according to Mr. Kolben, it is never less, even on its first appearance, than the size of a large ox, often bigger. It hangs in several fleeces over the Table-hill and the Wind or Devil's Hill; which fleeces, at last uniting, form a large cloud that covers the summits of these two hills. After this has rested for some time without change or motion, the wind bursts out suddenly from it with the utmost fury. The skirts of the cloud are white, but seem much more compact than the matter of common clouds; the upper parts are

of a leaden colour. No rain falls from it, but sometimes it discovers a great deal of humidity; at which times it is of a darker colour, and the wind issuing from it is broken, raging by fits of short continuance. In its usual state, the wind keeps up its first fury unabated for one, two, three, or eight days; and sometimes for a whole month together. The cloud seems all the while undiminished, though little fleeces are from time to time detached from it, and hurried down the sides of the hills, vanishing when they reach the bottom; so that during the storm the cloud seems to be supplied with new matter. When the cloud begins to brighten up, these supplies fail, and the wind proportionally abates. At length the cloud growing transparent the wind ceases. During the continuance of these south-east winds, the Table-valley is torn by furious whirlwinds. If they blow warm, they are generally of short duration; and in this case the cloud soon disappears. This wind rarely blows till after sun-set, and never longer than till towards midnight, though the cloud remains; but then it is thin and clear: but when the wind blows cold, it is a sure sign that it will last for some time, an hour at noon and midnight excepted; when it seems to lie still to recover itself, and then lets loose its fury anew.

The Europeans at the Cape consider the year as divided into two seasons, which they term *monsoons*. The wet monsoon or winter, and the dry one or summer. The first begins with our spring in March; the latter with September, when our summer ends. In the summer monsoon reign the south-east winds already mentioned; which, though they clear and render the air more healthy, yet make it difficult for ships outward bound to enter Table-bay. In the bad season, the Cape is much subject to fogs; and the north-west winds and rain make the inhabitants stay much at home. But there are frequent intermissions and many clear days till June and July; when it rains almost continually, and from thence till summer. The weather in winter, is cold, raw, and unpleasant; but never more rigorous than autumn in Germany. Water never freezes to above the thickness of half a crown; and as soon as the sun appears, the ice is dissolved. The Cape is rarely visited by thunder and lightning, excepting a little near the turn of the seasons, which never does any hurt. During the continuance of the south-east winds which rage in summer, the sky is free of all clouds except that on the Table and Wind Hills already mentioned; but during the north-west winds, the air is thick, and loaded with heavy clouds big with rain. If the south-east winds should cease for any length of time, the air becomes sickly by reason of the sea-weeds driving ashore and rotting; hence the Europeans are at such times affected with headaches and other disorders: but, on the other hand, the violence of those winds subjects them to inflammations of their eyes, &c.

The natives of this country are called *Hottentots*, in their own language; a word of which it is vain to inquire the meaning, since the language of this country can scarce be learned by any other nation. The Hottentot language is indeed said to be a composition of the most strange and disagreeable sounds, deemed by many the disgrace of speech, without human sound or articulation, resembling rather the noise of irritated turkeys, the chattering of magpies, hooting of owls, and depending on extraordinary vibrations, inflexions, and clappings of the tongue against the palate. If this account is true, however, it is obvious, that all the relations we have concerning the religion, &c. of the Hottentots derived from themselves, must fall to the ground, as nobody can pretend to understand a language in itself unintelligible. The manners and customs of these people, however, are easily observable, whether they themselves give the relation or not; and if their language is conformable to them, it is no doubt of a nature sufficiently wonderful.

Many accounts have been published concerning the extreme nastiness and filthy customs of the Hottentots; but from the observations of late travellers it appears, that these have either been exaggerated, or that the Hottentots (which is not improbable) have in some measure laid aside their former manners. Dr. Sparman describes them in much less disgusting terms, and M. Vaillant seems to have been charmed with their innocence and simplicity. According to the Doctor, these people are as tall as the generality of Europeans, though more slender in their persons, which he attributes to their scanty supply of food, and not accustoming themselves to hard labour. The characteristic of the nation, however, and which he thinks has not been observed by any one before, is, that they have small hands and feet in proportion to the other parts of the body. The distance between the eyes appears greater than in Europeans, by reason of the root of the nose being very low. The tip is rather flat, and the iris of the eye has generally a dark-brown cast, sometimes approaching to black. Their skins are of a yellowish brown, something like that of an European who has the jaundice in a high degree; though this colour does not in the least appear in the whites of the eyes. Their lips are thinner than those of their neighbours the *Negroes*, *Caffres*, or *Mozambiques*. "In fine (says our author), their mouths are of a middling size, and generally furnished with a set of the finest teeth that can be seen; and, taken together with the rest of their features, as well as their carriage, shape, and every motion, in short their *tout ensemble*, indicates health and delight, or at least an air of *sans souci*. This careless mien, however, discovers marks at the same time both of alacrity and resolution; qualities which the Hottentots, in fact, can show upon occasion." The hair of the head is black and frizzled, though not very close; and has so much the appearance of wool, that it would be taken for it, were it not for its harshness. They have but seldom any appearance of a beard, or hair upon other parts of their bodies; and when any thing of this kind happens to be visible, it is always very slight.

A general opinion has prevailed, that the Hottentot women have a kind of natural vail which covers the sexual parts; but this is denied by our author. "The women (says he) have no parts uncommon to the rest of their sex: but the clitoris and nymphæ, particularly of those who are past their youth, are pretty much elongated; a peculiarity which has undoubtedly got footing in this nation in consequence of the relaxation necessarily produced by the method they have of besmearing their bodies, their slothfulness, and the warmth of the climate."

The Hottentots besmear all their bodies copiously with fat mixed up with a little foot. "This (says our author) is never wiped off; on the contrary, I never saw them use any thing to clean their skins, excepting that, when in greasing the wheels of their waggons their hands were besmeared with tar and pitch, they used to get it off very easily with cow-dung, at the same time rubbing their arms into the bargain up to the shoulders with this cosmetic; so that as the dust and other filth, together with their footy ointment, and the sweat of their bodies, must necessarily, notwithstanding it is continually wearing off, in some measure adhere to the skin, it contributes not a little to conceal the natural hue of the latter, and at the same time to change it from a bright umber-brown to a brownish-yellow colour, obscured with filth and nastiness." The Doctor was enabled to discover the natural colour of the Hottentots by means of the nicety of some Dutch farmers' wives, who had made their Hottentot girls wash and scour their skins, that they might be less filthy in looking after the children, or doing any other work that required cleanliness. Many of the colonists, however, are of opinion, that this operation of washing is no improvement to the look of an Hottentot; but that their natural yellow is full as disagreeable as the black or brown

colour of the ointment; and that the washed skin of a native of this country seems to be deficient in dress, like shoes that want blacking. This the Doctor does not pretend to determine; though, whatever may be supposed deficient in look, we should think must be made up in cleanliness.

The Hottentots perfume their bodies by daubing them all over with the powder of an herb, the smell of which is at once rank and aromatic, approaching to that of the poppy mixed with spices. For this purpose they use various species of the diosina, called by them *bucku*, and which they imagine to be very efficacious in the cure of disorders. One species of this plant, growing about *Goud's-rivier*, is said to be so valuable, that no more than a thimble-full of its powder is given in exchange for a lamb.

By the ointment of foot and grease stuck full of the powder of *bucku*, a paste is formed which defends the bodies of the Hottentots in a great measure from the action of the air; so that they require very few clothes, and in fact go almost quite naked. The only covering of the men consists of two leather straps, which generally hang down the back from the chine to the thighs, each of them in the form of an isosceles triangle, their points uppermost, and fastened to a belt which goes round the waist, their bases not being above three fingers broad; so that the covering they form is extremely trifling. These straps have very little dressing bestowed upon them, so that they make a rattling noise as the Hottentot runs along; and our author supposes that they may produce an agreeable coolness by fanning him. Besides this, the men have a bag or flap made of skin which hangs down before, and is fastened to the belt already mentioned. The hollow part of this seems designed to receive that which with us modesty requires to be concealed; but being only fastened by a small part of its upper end to a narrow belt, in other respects hanging quite loose, it is but a very imperfect concealment; and when the wearer is walking, or otherwise in motion, it is none at all. They call this purse by the Dutch name of *jackall*, it being almost always prepared of the skin of that animal, with the hairy side turned outwards.

The women cover themselves much more scrupulously than the men, having always two, and very often three coverings like aprons; though even these seem to be abundantly small for what we should term decency in this country. The outermost of these, which is the largest, measures only from about six inches to a foot in breadth. All of them are made of a skin well prepared and greased, the outermost being adorned with glass beads strung in different figures. The outermost reaches about half-way down the thighs, the middle about a third, or one half less, and the third scarcely exceeds the breadth of the hand. The first is said to be designed for ornament, the second as a defence for modesty, and the third to be useful on certain occasions, which, however, are much less troublesome to the Hottentot than to the European females. Our author with great probability supposes, that it was the sight of this innermost apron which misled the reverend Jesuit Tackard, who, on his return to Europe, first propagated the stories concerning the natural veils or excrescences of the Hottentots. A story was likewise commonly believed, that the men in general had but one testicle, and that such as were not naturally formed in this manner were artificially made so. But this our author likewise denies; and though he says that such an operation might have been formerly performed upon the males, yet it is not so now.

The other garments worn by the Hottentots are formed of a sheep's-skin with the woolly side turned inwards: this forming a kind of cloak, which is tied forwards over the breast: though sometimes, instead of a sheep's-skin, some smaller kind of fur is used as a material. In warm weather they let this

cloak hang carelessly over their shoulders, so that it reaches down to the calves of the legs, leaving the lower part of the breast, stomach, and fore-part of the legs and thighs bare; but in cold weather they wrap it round them; so that the fore-part of the body is likewise pretty well covered by it as far as the knees; but as one sheep-skin is not sufficient for this purpose, they sew on a piece on the top at each side with a thong or catgut. In warm weather they sometimes wear the woolly side outwards, but more frequently take off the cloak altogether, and carry it under the arm. This cloak or *krossi* serves them not only for clothes, but bedding also; and in this they lie on the bare ground, drawing up their bodies so close, that the cloak is abundantly sufficient to cover them.—The cloaks used by the women differ little from those already described, excepting only that they have a long peak on them, which they turn up; forming with it a little hood or pouch, with the hairy side inwards. In this they carry their little children, to which the mother's breasts are now and then thrown over the shoulders; a custom common among some other nations, where the breasts of the females, by continual want of support, grow to an enormous length. The men commonly wear no covering on their heads, though our author says he has seen one or two who wore a greasy nightcap made of skin with the hair taken off. Those who live nearest the colonists have taken a liking to the European hats, and wear them slouched all round, or with only one side turned up. The women also frequently go bare-headed; though they sometimes wear a cap made in the shape of a short truncated cone. This appears to be the section of some animal's stomach, and is perfectly blacked by soot and fat mixed up together. These caps are frequently prepared in such a manner as to look shaggy; others have the appearance of velvet; and, in our author's opinion, are not inelegant. Over this they sometimes wear an oval wreath or kind of crown made of a buffalo's hide, with the hair outermost. It is about four fingers breadth in height, and surrounds the head so as to go a little way down upon the forehead, and the same depth on the neck behind, without covering the upper part of the cap above described. The edges of this wreath, both upper and under, are always smooth and even; each of them set with a row of small shells of the *cyprea* kind, to the number of more than 30, in such a manner that, being placed quite close to one another, their beautiful white enamel, together with their mouths, are turned outwards. Between two rows of these shells run two others parallel, or else waved and indented in various ways. The Hottentots never adorn their ears or noses as other savages do: though the latter are sometimes marked with a black streak of soot; at others, though more rarely, with a large spot of red lead; of which last, on festivals and holidays, they likewise put a little on their cheeks. The necks of the men are bare, but those of the women are ornamented with a thong of undressed leather, upon which are strung eight or ten shells. These, which are about the size of beans, have a white ground, with large black spots of different sizes: but as they are always made use of in a burnished state, the Doctor is uncertain whether they be of that kind which is received in the *Systema Naturæ* under the name of *nerita albicilla*, or *exuvia*. These shells are sold at an enormous price, no less than a sheep for each; as it is said that they come from the most distant coast of Calfraria. Both men and women are very fond of European beads, particularly the blue and white ones of the size of a pea; of which they tie several rows round the middle, and next to the girdles which hold the coverings above mentioned. Besides these ornaments, they use rings on their arms and legs; most of them made of thick leather straps generally cut in a circular shape; which by being beat and held over the fire, are rendered tough enough to retain the curvature that is given them. From these rings it has been almost universally believed, that

the Hottentots wrap guts about their legs in order to eat them occasionally. The men wear from one to five or six of these rings on their arms, just above the wrist, but seldom on their legs. The matrons of a higher rank have frequently a considerable number of them both on their arms and legs, especially on the latter; so that they are covered with them from the feet up to the knees. These rings are of various thicknesses, from that of a goose-quill to two or three times that size. Sometimes they are made of pieces of leather forming one entire ring; so that the arms and feet must be put through them when the wearer wishes to put them on. They are strung upon the legs, small and great, without any nicety; but are so large, that they shake and get twisted when the person walks. Rings of iron or copper, but especially of brass, of the size of a goose-quill, are considered as more genteel than those of leather. However, they are sometimes worn along with the latter, to the number of six or eight at a time, particularly on the arms. The girls are not allowed to use any rings till they are marriageable. The Hottentots seldom wear any shoes; but such as they do make use of are of the same form with those worn by the African peasants, by the Esthonians, and Livonians, as well as by some Finlanders; so that it is impossible to say whether they are the invention of the Dutch or the Hottentots themselves. They are made of undressed leather, with the hairy side outward; without any other preparation than that of being beat and moistened. If it be a thick and stout hide, as that of a buffalo, it is kept for some hours in cow-dung, which renders it besides very soft and pliable. Some kind of grease is afterwards used for the same purpose. The shoes are then made in the following manner. They take a piece of leather, of a rectangular form, something longer and broader than the foot of the person for whom the shoes are intended; the two foremost corners are doubled up together, and sewed down, so as to cover the fore-part of the foot; but this seam may be avoided, and the shoes made much neater at the toes, by fitting immediately over them a cap taken from the membrane in the knee joint of the hind-leg of some animal. In order to make this piece of skin or leather rise up to the height of an inch on both sides of the foot, and close it in neatly, it is pierced with holes at small distances all round the edge, as far as the hind-quarters; and through these holes is passed a thong, by which the rim is drawn up into gathers. In order to make strong hind-quarters, the back part of the piece of leather is doubled inwards, and then raised up and pressed along the heel. The ends of the thong or gathering string are then threaded on both sides through the upper edge of the hind-quarters, to the height of about two inches; they are then carried forwards, in order to be drawn through two of the above-mentioned holes on the inside of each rim. Lastly, they are tied over the instep, or, if it be thought necessary to tie the shoe still faster, they are carried cross-ways over the instep, and so downwards under the thong, which comes out from the hind-quarters; then upwards again over the ankle, and even round the leg itself if the wearer chooses. Shoes of this kind are not without their advantages; they fit as neat upon the foot as a stocking, and at the same time preserve their form. They are easily kept soft and pliable by constantly wearing them; or, if at any time they should become somewhat hard, this is easily remedied by beating and greasing them. They are extremely light and cool, by reason that they do not cover so much of the foot as a common shoe. They wear very well, as they are without any seam, and the soles of the shoes are both tough and yielding. These field shoes, as they are called, being made of almost raw leather, are much more durable than those of tanned leather, which are burnt up by the African sands, and slip and roll about in them; being also very ready to be torn in a rocky soil, which is not the case with the others.

The Doctor is of opinion, that these shoes would be particularly useful to sailors.

The huts of the Hottentots are built exactly alike; and we may readily give credit to our author when he tells us, that they are done in a style of architecture which does not a little contribute to keep envy from insinuating itself under their roofs. Some of these huts are circular, and others of an oblong shape, resembling a round beehive or vault; the ground-plot being from 18 to 24 feet in diameter. The highest are so low, that it is scarce ever possible for a middle-sized man to stand upright even in the centre of the arch; "but (says our author) neither the lowness thereof, nor that of the door, which is but just three feet high, can perhaps be considered as any inconvenience to an Hottentot, who finds no difficulty in stooping and crawling upon all fours, and is at any time more inclined to lie down than to stand. The fire-place is in the middle of each hut, by which means the walls are not so much exposed to danger from fire. From this situation of the fire-place also the Hottentots derive this additional advantage, that they can all sit or lie in a circle round it, enjoying equally the warmth of the fire. The door, low as it is, alone lets in daylight or lets out the smoke: and so much are these people accustomed to live in such smoky mansions, that their eyes are never affected by it in the least, nor even by the mephitic vapour of the fuel, which to Europeans would be certain death.

The frame of the arched roof is composed of slender rods or sprays of trees. These being previously bent into a proper form, are laid, either whole or pieced, some parallel to one another, others crosswise; after which they are strengthened by binding others round them in a circular form with withies. All these are taken principally from the *cliffortia conoides*, which grows plentifully in this country near the rivers. Large mats are then placed very neatly over this lattice work, so as perfectly to cover the whole. The aperture which is left for the door is closed occasionally by a skin or piece of matting. These mats are made of a kind of cane or reed in the following manner: The reeds being laid parallel to one another, are fastened together with sinews or catgut, or some kind of catgut which they have had an opportunity of getting from the Europeans; so that they have it in their power to make them as long as they please, and as broad as the length of the reeds, which is from six to ten feet. The colonists make use of the same kind of matting, next to the tilts of their waggons, to prevent the sail-cloth from being rubbed and worn, and likewise to help to keep out the rain.

In a *craal*, or Hottentot-village, the huts are most commonly disposed in a circle, with the doors inwards; by which means a kind of court-yard is formed, where the cattle are kept at nights. The milk, as soon as taken from the cow, is put to other milk which is curdled, and kept in a leather sack with the hairy side inwards, as being the more cleanly; so that thus the milk is never drunk sweet. In some northern districts, where the land is dry and parched, both Hottentots and colonists are shepherds. When an Hottentot has a mind to shift his dwelling, he lays all the mats, skins, and rods, of which it is composed, on the backs of his cattle, which, to a stranger, makes a monstrous, unwieldy, and even ridiculous appearance.

There is a species of Hottentots named *Boskiesmen*, who dwell in the woody and mountainous parts, and subsist entirely by plunder. They use poisoned arrows, which they shoot from bows about a yard long and an inch in thickness in the middle, very much pointed at both ends. Dr. Sparrman does not know the wood of which they are made, but thinks that it is not very elastic. The strings were made, some of sinews, and others of a kind of hemp, or the inner bark of some vegetable; but most of them in a very slovenly manner. The ar-

rows are about a foot and an half long, headed with bone, and a triangular bit of iron; having also a piece of quill bound on very strongly with sinews, about an inch and an half from the top, in order to prevent it from being easily drawn out of the flesh. The whole is lastly covered over with a very deadly poison of the consistence of an extract. Their quivers are two feet long and four inches in diameter; and are supposed by our author to be made of the branch of a tree hollowed out, or more probably of the bark of one of the branches taken off whole, the bottom and cover being made of leather. It is daubed on the outside with an unctuous substance which grows hard when dry, and is lined about the aperture with the skin of the yellow serpent, supposed to be the most deadly in all that part of the world. The poison they make use of is taken from the most venomous serpents; and, ignorant as the Hottentots are, they all know that the poison of serpents may be swallowed with safety. See the article BOSKIESMEN.

In the year 1779, Lieutenant William Paterfon, who took a long and dangerous excursion from the Cape along the western side of the continent, discovered a new tribe of Hottentots, whose living, he says, is in the highest degree wretched, and who are apparently the dirtiest of all the Hottentot tribes. Their dress is composed of the skins of seals and jackalls, the flesh of which animals they feed upon. If a grampus happen to be cast ashore, they remove their huts to the place, and feed upon the carcase as long as it lasts, though perhaps it may be half rotten by the heat of the weather. They besmear their skins with the oil; by which means they smell so exceedingly rank that their approach may be thus perceived before they come in sight. Their huts, however, are much superior to those of the southern Hottentots already described; being higher, thatched with grass, and furnished with stools made of the back-bones of the grampus. They dry their fish in the sun; as the lieutenant found several kinds of fish near their huts suspended from poles, probably for this purpose. He found also several aromatic plants which they had been drying.

With respect to the religion of the Hottentots, it does not appear that they have any. On being questioned on the subject of a Creator and Governor of the universe, they answer that they know nothing of the matter; nor do they seem willing to receive any instruction. All of them, however, have the most firm belief in the powers of magic; from whence it might be inferred that they believe in an evil being analogous to what we call *the devil*; but they pay no religious worship to him, though from this source they derive all the evil that happens, and among these evils they reckon cold, rain, and thunder. So monstrously ignorant are they, that many of the colonists assured Dr. Sparrman, that their Boskiesmen would abuse the thunder with many opprobrious epithets, and threaten to assault the flashes of lightning with old shoes or any thing that comes first to hand. Even the most intelligent among them could not be convinced by all the arguments our author could use, that rain was not always an evil, and that it would be an unhappy circumstance if it were never to rain. "A maxim (says he), from a race of men in other respects really endowed with some sense, and frequently with no small degree of penetration and cunning, ought, methinks, to be considered as an indelible religious or superstitious notion entertained by them from their infancy, rather than as an idea taken up on due deliberation and consequent conviction."

As the Hottentots have so strong a belief in the powers of magic, it is no wonder that they have abundance of witches and conjurors among them. These will readily undertake any thing, even to put a stop to thunder and rain, provided they be well paid for their pains; and if it happen to thunder or rain longer than the time they promised, they have always for an excuse, that a more powerful conjurer has put a stop to

their incantations. Many of the Hottentots believe that all disorders incident to the human body are cured by magic. The wizards are fond of encouraging this idea; but at the same time take care to employ both external and internal remedies. Among the former may be reckoned a cure performed upon Captain Cook in some of the South-Sea islands, viz. that of pinching, cuffing, and kneading the whole body of the patient. To this, however, the Hottentot physicians add that of pretending to suck out a bone from some part of the patient's body. After this it sometimes happens that the sick person is relieved, and sometimes not. In the latter case the operation is repeated; and, if he dies, his friends lament that he was bewitched beyond the power of any one to assist him. These conjurors appear to be possessed of considerable skill of hand. Our author was informed by a colonist, that when he was a child, and playing with a bone of an ox which he drew as a cart, it appeared to his great astonishment to be sucked out of a sick person's back by a wizard; and as far as he could remember, the patient recovered soon after. These pretensions of the wizards sometimes render them liable to persecutions; and there is an instance of a chief named *Paloo*, who ordered a general massacre among them, in hopes of cutting off the person who he believed had bewitched himself, and afflicted him with sore eyes.

The superstition of the Hottentots never operates in the way of making them afraid in the dark. They seem, however, to have some ideas of a future state, as they reproach their friends, when dead, with leaving them so soon; at the same time admonishing them from henceforth to demean themselves properly: by which they mean that their deceased friends should not come back again and haunt them, nor allow themselves to be made use of by wizards to bring any mischief on those that survive them.

There is a genus of insects (the *mantis*) which, it has been generally thought, the Hottentots worship; but our author is so far from being of this opinion, that he tells us they have more than once caught several of them for him, and assisted him in sticking pins through them as he did through other insects. "There is (says he), however, a diminutive species of this insect, which some think it would be a crime, as well as very dangerous, to do any harm to: but this we have no more reason to look upon as any kind of religious worship, than we have to consider in the same light a certain superstitious notion prevalent among many of the more simple people in our own country (Sweden), who imagine that three sins will be forgiven them, if they set a cockchafer on its feet that has happened to fall upon its back. The moon, according to Kolben, receives a kind of adoration from the Hottentots; but the fact is, that they merely take the opportunity of her beams, and at the same time of the coolness of the night, to amuse themselves with dancing; and consequently have no more thoughts of worshipping her than the Christian colonists who are seen at that time strolling in great numbers about the streets, and parading on the stone steps with which their houses are usually encircled." The conjurors themselves, according to our author, are generally freethinkers, who have neither religion nor superstition of any kind.

Lieutenant Paterfon has given the following account of the Caffres, a nation whom no European but himself has ever seen, and who inhabit the country to the north-east of the Cape as far down as 31 South latitude. The men are from five feet ten inches to six feet high, and well proportioned; and in general manifest great courage in attacking lions or other wild beasts. The nation, at the time he visited them, was divided into two parties, one to the northward, commanded by a chief named *Chatha Bea*, or *Tambusbie*, which latter appellation he had obtained from his mother, a woman of an Hottentot tribe

named *Tambukies*. This man was the son of a chief named *Pharao*, who died about three years before, and left two sons *Cha Cha Bea*, and another named *Dfrika*, who claimed the supreme authority on account of his mother being of the Caffre nation. This occasioned a contest between the two brothers, in the course of which *Cha Cha Bea* was driven out of his territories with a great number of his party; after which he took up his residence at a place named *Khouta*, where he had an opportunity of entering into an alliance with the Boshtiefmen.—The Caffres are of a jet black colour, their eyes large, and their teeth as white as ivory. The clothing of both sexes is nearly the same; consisting entirely of the hides of oxen, which are made as pliant as cloth. The men wear tails of different animals tied round their thighs, pieces of brass in their hair, and large rings of ivory on their arms: they are likewise adorned with the hair of lions, feathers fastened on their heads, &c. They use the ceremony of circumcision, which is usually performed upon them when they are nine years of age. They are very fond of dogs, which they exchange for cattle, and will even give two bullocks in exchange for one dog which pleases them. They are expert in throwing lances, and in time of war use shields made of the hides of oxen. Throughout the day the men occupy themselves in hunting, fighting, or dancing; the women being employed in the cultivation of their gardens and corn. They seem not to be destitute of the knowledge of agriculture, as they cultivate several vegetables which do not naturally grow in their own country, viz. tobacco, water-melons, a small kind of kidney-beans, and hemp. The women also make their baskets and the mats on which they lie. The men are very fond of their cattle, and cut their horns in such a manner as to be able to turn them into any shape they please, and teach them to answer to a whistle. Mr. Paterfon is of opinion that the country they inhabit is greatly superior to any part of Africa.

Of the Dutch settlements and policy at the Cape, Mr. Forster gives the following account. "The income of the governor here is very considerable; for, besides a fixed appointment, and the use of houses, gardens, proper furniture, and every thing that belongs to his table, he receives about 10 dollars for every leagre of wine which the company buy of the farmer in order to be exported to Batavia. The company allows the sum of 40 dollars for each leagre, of which the farmer receives but 24: what remains is shared between the governor and second or deputy; the former taking two-thirds, which sometimes are said to amount to 4000 dollars per annum. The deputy-governor has the direction of the company's whole commerce here, and signs all orders to the different departments under him, as well as the governor to others. He and the fiscal have the rank of *upper koopman*. The fiscal is at the head of the police, and sees the penal laws put in execution: his income consists of fines, and of the duties laid on certain articles of commerce; but if he be strict in exacting them, he is universally detested. The sound policy of the Dutch has likewise found it necessary to place the fiscal as a check, to overawe the other officers of the company, that they may not counteract the interests of their masters, or infringe the laws of the mother-country. He is, to that end, commonly well versed in juridical affairs, and depends solely upon the mother-country. The major (at present Mr. Von Prehn, who received us with great politeness) has the rank of *koopman* or merchant: this circumstance surprises a stranger, who, in all other European states, is used to see military honours confer distinction and precedence; and appears still more singular to one who knows the contrast in this particular between Holland and Russia, where the idea of military rank is annexed to every place, even that of a professor at the university. The number of regular soldiers at this colony amounts to about 700; of which 400 form the garrison of the

fort, near the Cape town. The inhabitants capable of bearing arms form a militia of 4000 men; of whom a considerable part may be assembled in a few hours, by means of signals made from alarm-places in different parts of the country. We may from hence make some estimate of the number of white people in this colony, which is at present so extensive, that the distant settlements are above a month's journey from the Cape: but these remote parts lie sometimes more than a day's journey from each other, are surrounded by various nations of Hottentots, and too frequently feel the want of protection from their own government at that distance. The slaves in this colony are at least in the proportion of five or more to one white person. The principal inhabitants at the Cape have sometimes from 20 to 30 slaves, which are in general treated with great lenity, and sometimes become great favourites with their masters, who give them very good clothing, but oblige them to wear neither shoes nor stockings, reserving these articles to themselves. The slaves are chiefly brought from Madagascar, and a little vessel annually goes from the Cape thither on that trade; there are, however, besides them, a number of Malays and Bengalese, and some negroes. The colonists themselves are for the greatest part Germans, with some families of Dutch, and some of French Protestants. The character of the inhabitants of the town is mixed. They are industrious, but fond of good living, hospitable, and social; though accustomed to hire their apartments to strangers for the time they touch at this settlement, and used to be complimented with rich presents of stuffs, &c. by the officers of merchant ships. They have no great opportunities of acquiring knowledge, there being no public schools of note at the Cape; their young men are therefore commonly sent to Holland for improvement, and their female education is too much neglected. A kind of dislike to reading, and the want of public amusements, make their conversation uninteresting, and too frequently turn it upon scandal, which is commonly carried to a degree of inveteracy peculiar to little towns. The French, English, Portuguese, and Malay languages are very commonly spoken, and many of the ladies have acquired them. This circumstance, together with the accomplishments of singing, dancing, and playing a tune on the lute, frequently united in an agreeable person, make amends for the want of refined manners and delicacy of sentiment. There are, however, among the principal inhabitants, persons of both sexes, whose whole deportment, extensive reading, and well-cultivated understanding, would be admired and distinguished even in Europe. Their circumstances are in general easy, and very often affluent, on account of the cheap rate at which the necessaries of life are to be procured: but they seldom amass such prodigious riches here as at Batavia; and I was told the greatest private fortune at the Cape did not exceed 100,000 dollars, or about 22,500l. sterling.

"The farmers in the country are very plain hospitable people; but those who dwell in the remotest settlements seldom come to town, and are said to be very ignorant: this may easily be conceived, because they have no better company than Hottentots, their dwellings being often several days journey asunder, which must in a great measure preclude all intercourse. The vine is cultivated in plantations within the compass of a few days journey from the town; which were established by the first colonists, and of which the ground was given in perpetual property to them and their heirs. The company at present never part with the property of the ground, but let the surface to the farmer for an annual rent, which, though extremely moderate, being only 25 dollars for 60 acres, yet does not give sufficient encouragement to plant vineyards. The distant settlements, therefore, chiefly raise corn and rear cattle; nay, many of the settlers entirely follow the latter branch of rustic employment, and some have very numerous flocks. We were told there were

two farmers who had each 15,000 sheep, and oxen in proportion; and several who possessed 6000 or 8000 sheep, of which they drive great droves to town every year: but lions and buffaloes, and the fatigue of the journey, destroy numbers of their cattle before they can bring them so far. They commonly take their families with them in large waggon covered with linen or leather, spread over hoops, and drawn by 8, 10, and sometimes 12 pair of oxen. They bring butter, mutton-tallow, the flesh and skins of sea-cows (hippopotamus), together with lion and rhinoceros' skins to sell. They have several slaves, and commonly engage in their service several Hottentots of the poorer sort, and (as we were told) of the tribe called Boshiesman, *Boschmans*, or *Busbmenn*, who have no cattle of their own, but commonly subsist by hunting, or by committing depredations on their neighbours. The opulent farmers set up a young beginner by intrusting to his care a flock of 400 or 500 sheep, which he leads to a distant spot, where he finds plenty of good grass and water; the one-half of all the lambs which are yearned fall to his share, by which means he soon becomes as rich as his benefactor.

"Though the Dutch company seem evidently to discourage all new settlers, by granting no lands in private property; yet the products of the country have of late years sufficed not only to supply the isles of France and Bourbon with corn, but likewise to furnish the mother-country with several ship-loads. These exports would certainly be made at an easier rate than at present, if the settlements did not extend so far into the country, from whence the products must be brought to the Table-bay by land-carriage, on roads which are almost impassable. The intermediate spaces of uncultivated land between the different settlements are very extensive, and contain many spots fit for agriculture; but one of the chief reasons why the colonists are so much divided and scattered throughout the country, is to be met with in another regulation of the company, which forbids every new settler to establish himself within a mile of another. It is evident, that if this settlement were in the hands of the commonwealth, it would have attained to a great population, and a degree of opulence and splendor of which it has not the least hopes at present: but a private company of East-India merchants find their account much better in keeping all the landed property to themselves, and tying down the colonist, lest he should become too great and powerful.

"The wines made at the Cape are of the greatest variety possible. The best, which is made at M. Vander Spy's plantation of Constantia, is spoken of in Europe, more by report than from real knowledge; 30 leagues (or pipes) at the utmost are annually raised of this kind, and each league sells for about 50l. on the spot. The vines from which it is made were originally brought from Shiraz in Persia. Several other sorts grow in the neighbourhood of that plantation, which produce a sweet rich wine, that generally passes for genuine Constantia in Europe. French plants of burgundy, muscade, and frontignan, have likewise been tried, and have succeeded extremely well, sometimes producing wines superior to those of the original soil. An excellent dry wine, which has a slight agreeable tartness, is commonly drunk in the principal families, and is made of Madeira vines transplanted to the Cape. Several low sorts, not entirely disagreeable, are raised in great plenty, and sold at a very cheap rate; so that the sailors of the East-India ships commonly indulge themselves very plentifully in them whenever they come ashore.

"The products of the country supply with provisions the ships of all nations which touch at the Cape. Corn, flour, biscuit, salted beef, brandy, and wine, are to be had in abundance, and at moderate prices; and their fresh greens, fine fruits, good mutton and beef, are excellent restoratives to seamen who have made a long voyage."

HOTTINGER (JOHN HENRY), born at Zurich in Switzerland in 1620, professed the Oriental languages at Leyden, and was esteemed by all his learned colleagues. He was drowned, with part of his family, in the river Leinit, in the year 1667. He wrote a prodigious number of works; the principal of which are, 1. *Exercitationes Anti-Morinianæ de Pentateucho Samaritano*, 4to; in which he defends the Hebrew text against father Morin. 2. *Histeria Orientalis*, 4to. 3. *Bibliothecarius quadripartitus*. 4. *Thesaurus Philologicus Sacræ Scripturæ*, 4to. 5. *Histeria Ecclesiastica*. 6. *Promptuarium, sive Bibliotheca Orientalis*, 4to. 7. *Dissertationes miscellaneæ*, &c.

HOTTONIA, WATER-VIOLET; a genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 21st order, *Preciæ*. The corolla is salver-shaped; the stamina are placed in the tube of the corolla; and the capsule is unilocular. There is but one species, viz. the palustris, with a naked stalk. It grows naturally in the standing waters in many parts of England. The leaves, which are for the most part immersed in water, are finely winged and flat like most of the sea-plants; and at the bottom have long fibrous roots, which strike into the mud: the flower-stalks rise five or six inches above the water, and toward the top have two or three whorls of purple flowers, terminated by a small cluster of the same. These flowers have the appearance of those of the stock gilliflower, so make a pretty appearance on the surface of the water. It may be propagated in deep standing waters, by procuring its seeds when they are ripe, from the places of their natural growth; which should be immediately dropped into the water in those places where they are designed to grow, and the spring following they will appear; and if they are not disturbed, they will soon propagate themselves in great plenty. Cows eat this plant; swine refuse it.

HOUBRAKEN (JACOB), a celebrated engraver, whose great excellence consisted in the portrait line. His works are distinguished by an admirable softness and delicacy of execution, joined with good drawing, and a fine taste. If his best performances have ever been surpassed, it is in the masterly determination of the features, which we find in the works of Nanteuil, Edelinck, and Drevet: this gives an animation to the countenance, more easily to be felt than described. His works are pretty numerous; and most of them being for English publications, they are sufficiently known in this country. In particular the greater and best part of the collection of portraits of Illustrious men, published in London by I. and P. Knapton, were by his hand.

HOVEDON (ROGER DE), born of an illustrious family in Yorkshire, most probably at the town of that name, now called *Hloxden*, some time in the reign of Henry I. After he had received the first parts of education in his native country, he studied the civil and canon law, which were then become most fashionable and lucrative branches of learning. He became domestic chaplain to Henry II. who employed him to transact several ecclesiastical affairs; in which he acquitted himself with honour. But his most meritorious work was his *Annals of England*, from A. D. 731, when Bede's Ecclesiastical History ends, to A. D. 1202. This work, which is one of the most voluminous of our ancient histories, is more valuable for the sincerity with which it is written, and the great variety of facts which it contains, than for the beauty of its style, or the regularity of its arrangement.

HOUGH, HAM, in the manege, the joint of the hind-leg of a beast, which connects the thigh to the leg. See HAM.

To **HOUGH**, or *cut the Houghs*, is to ham-string, or to disable an animal by cutting the sinews of the ham.

HOULIERES (ANTOINETTE DE), a French lady, whose poetry is highly esteemed in France. Her works and those of her daughter have been collected and printed together in two

volumes. Most of the Idyls, particularly those on sheep and birds, surpass every thing of the kind in the French language: the thoughts and expressions are noble; and the style pure, flowing, and chaste. Mademoiselle des Houlières carried the poetic prize in the French academy against Fontenelle. Both of these ladies were members of the academy of Ricovatri; the mother was also a member of the academy of Arles. Those who desire to be more particularly acquainted with the history of Madam des Houlières, may consult her Life prefixed to her works in the Paris edition of 1747, 2 vols. 12mo.

HOULSWORTHY, a large town of Devonshire, seated between two branches of the river Tamer, having a good market for corn and provisions. W. long. 4. 42. N. lat. 50. 50.

HOUND. See the articles CANIS, BLOOD-HOUND, and GRE-HOUND.

Training of HOUNDS. Before we speak of the methods proper to be used for this purpose, it will be necessary to point out the qualities which sportsmen desire to meet with in these animals. It is generally understood, that hounds of the middle size are the most proper, it being remarked, that all animals of that description are stronger than either such as are very small or very large. The shape of the hound ought to be particularly attended to; for if he be not well proportioned, he can neither run fast nor do much work. His legs ought to be straight, his feet round, and not very large; his shoulders back; his breast rather wide than narrow; his chest deep, his back broad, his head small, his neck thin; his tail thick and bushy, and if he carry it well so much the better. None of those young hounds which are *out at the elbow*, or such as are weak from the knee to the foot, should ever be taken into the pack. That the pack may look well, it is proper that the hounds should be as much as possible of a size: and if the animals be handsome at the same time, the pack will then be perfect. It must not, however, be thought, that this contributes any thing to the *goodness* of a pack; for very unhandsome packs, consisting of hounds entirely different in size and colour, have been known to afford very good sport. It is only necessary that they should run well together; to which indeed an uniformity in size and shape would seem to contribute in some degree. The pack that can run ten miles, or any other considerable space, in the shortest time, may be said to go fastest, though the hounds taken separately might be considerably inferior to others in swiftness. A pack of hounds, considered in a collective body, go fast in proportion to the excellence of their noses and the head they carry. Packs which are composed of hounds of various kinds seldom run well. When the packs are very large, the hounds are seldom sufficiently hunted to be good; twenty or thirty couple, therefore, or at most forty, will be abundantly sufficient for the keenest sportsman in this country, as thus he may be enabled to hunt three or even four times a-week. The number of hounds to be kept, must, however, in a considerable degree, depend on the strength of the pack and the country in which you hunt. They should be left at home as seldom as possible; and too many old hounds should not be kept. None ought to be kept above five or six seasons, though this also is somewhat uncertain, as we have no rule for judging how long a hound will last.

In breeding of hounds, considerable attention ought to be paid to the dog from whom you breed. All such are to be rejected as have a tender nose, as are *babblers* or *skirters*. An old dog should never be put to an old bitch; nor should any attempts be made to cross the breed unless in a proper and judicious manner. Mr. Beckford, in his Essay on Hunting, informs us, that he has seen fox-hounds bred out of a Newfoundland dog and fox-hound bitch; the whelps were monstrously ugly, and had other bad qualities besides. The cross most likely to be of service to a fox-hound is the beagle. The reason of crossing the breeds sometimes is, that the imperfections of one

may sometimes be remedied by another. The months of January, February, and March, are the best for breeding; late puppies seldom thrive. After the females begin to grow big with young, it will not be proper to let them hunt any more, or indeed to remain for a much longer time in the kennel. Sometimes these animals will have an extraordinary number of whelps. Mr. Beckford informs us, that he has known a bitch have 15 puppies at a litter; and he assures us, that a friend of his informed him, that a hound in his pack brought forth 16, all of them alive. In these cases it is proper to put some of the puppies to another bitch, if you want to keep them all; but if any are destroyed, the best coloured ought to be kept. The bitches should not only have plenty of flesh, but milk also; and the puppies should not be taken from them till they are able to take care of themselves: their mothers will be relieved when they learn to lap milk, which they will do in a short time. After the puppies are taken away from their mothers, the litter should have three purging balls given them, one every other morning, and plenty of whey the intermediate day. If a bitch bring only one or two puppies, and you have another that will take them, by putting the puppies to her the former will soon be fit to hunt again. She should, however, be first physicked, and it will also be of service to anoint her dugs with brandy and water.

Whelps are very liable to the distemper to which dogs in general are subject, and which frequently makes great havock among them at their walks; and this is supposed by Mr. Beckford to be owing to the little care that is taken of them. "If the distemper (says he) once get among them, they must all have it: yet notwithstanding that, as they will be constantly well fed, and will lie warm (in a kennel built on purpose), I am confident it would be the saving of many lives. If you should adopt this method, you must remember to use them early to go in couples: and when they become of a proper age, they must be walked out often; for, should they remain confined, they would neither have the health, shape, or understanding, which they ought to have. When I kept harriers, I bred up some of the puppies at a distant kennel; but having no servants there to exercise them properly, I found them much inferior to such of their brethren as had the luck to survive the many difficulties and dangers they had undergone at their walks; these were afterwards equal to any thing, and afraid of nothing; whilst those that had been nursed with so much care, were weakly, timid, and had every disadvantage attending private education. I have often heard as an excuse for hounds not hunting a cold scent, that they were too *high-bred*. I confess I know not what that means: but this I know, that hounds are frequently too *ill-bred* to be of any service. It is judgment in the breeder, and patience afterwards in the huntsman, that makes them hunt.

"When young hounds are first taken in, they should be kept separate from the pack; and as it will happen at a time of the year when there is little or no hunting, you may easily give them up one of the kennels and grafs court adjoining. Their play frequently ends in a battle; it therefore is less dangerous where all are equally matched. If you find that they take a dislike to any particular hound, the safest way will be to remove him, or it is probable they will kill him at last. When a feeder hears the hounds quarrel in the kennel, he halloos to them to stop them; he then goes in among them, and flogs every hound he can come near. How much more reasonable, as well as efficacious, would it be, were he to see which were the combatants before he speaks to them! Punishment would then fall, as it ought, on the guilty only. In all packs there are some hounds more quarrelsome than the rest: and it is to them we owe all the mischief that is done. If you find chaf-

tisement cannot quiet them, it may be prudent to break their holders; for, since they are not necessary to them for the meat they have to eat, they are not likely to serve them in any good purpose. Young hounds should be fed twice a day, as they seldom take kindly to the kennel meat at first, and the distemper is most apt to seize them at this time. It is better not to round them till they are thoroughly settled; nor should it be put off till the hot weather, for then they would bleed too much. It may be better, perhaps, to round them at their quarters, when about six months old; should it be done sooner, it would make their ears tuck up. The tailing of them is usually done before they are put out; it might be better, perhaps, to leave it till they are taken in. Dogs must not be rounded at the time they have the distemper upon them, as the loss of blood would weaken them too much.

"If any of the dogs be thin over the back, or any more quarrelsome than the rest, it will be of use to cut them: I also pay such bitches as I shall not want to breed from; they are more useful, are flouter, and are always in better order; besides, it is absolutely necessary if you hunt late in the spring, or your pack will be very short for want of it. The latter operation, however, does not always succeed; it will be necessary therefore to employ a skilful person, one on whom you can depend; for if it be ill done, though they cannot have puppies, they will go to heat notwithstanding. They should be kept low for several days before the operation is performed, and must be fed on thin meat for some time after."

It is impossible to determine how many young hounds ought to be bred in order to keep up the pack, as this depends altogether on contingencies. The deficiencies of one year must be supplied by the next; but it is probable, that from 30 to 35 couple of old hounds, and from eight to twelve couple of young ones, will answer the purpose where no more than 40 couple are to be kept. A considerable number, however, ought always to be bred; for it is undoubtedly and evidently true, that those who breed the greatest number of hounds must expect the best pack.

After the hounds have been rounded, become acquainted with the huntsman, and answer to their names, they ought to be coupled together, and walked out among sheep. Such as are particularly ill-natured ought to have their couples loose about their necks in the kennel till they become reconciled to them. The most stubborn ought to be coupled to old hounds rather than to young ones; and two dogs should not be coupled together when you can avoid it. As young hounds are awkward at first, a few ought only to be set out at a time with people on foot, and they will soon afterwards follow a horse. When they have been walked out often in this manner amongst the sheep, they should be uncoupled by a few at a time, and those chastised who offer to run after the sheep; but it will be difficult to reclaim them after they have once been allowed to taste blood. Some are accustomed to couple the dogs with a ram in order to break them from sheep; but this is very dangerous for both parties. Mr. Beckford relates a story of a nobleman who put a large ram into his kennel in order to break his hounds from sheep: but when he came some time after to see how nobly the ram defended himself, he found him entirely eaten up, and the hounds gone to sleep after having filled their bellies.

When hounds are to be aired, it is best to take them out separately, the old ones one day, and the young another; though, if they are to have whey from a distant dairy, both old and young may be taken out together, observing only to take the young hounds in couples, when the old ones are along with them. Young hounds are always apt to fall into mischief, and even old ones when idle will be apt to join them. Mr. Beck-

ford mentions a whole pack running after a flock of sheep through the mere accident of a horse's falling, and then running away.

With regard to the first entering of hounds to a scent, our author gives such directions as have subjected him to a severe charge of inhumanity. We shall give them in his own words. "You had better enter them at their own game; it will save you much trouble afterwards. Many dogs, I believe, like that scent best which they were first blooded to: but be this as it may, it is most certainly reasonable to use them to that which it is intended they should hunt. It may not be amiss first when they begin to hunt to put light collars on them. Young hounds may easily get out of their knowledge; and shy ones, after they have been much beaten, may not choose to return home. Collars, in that case, may prevent their being lost.—You say you like to see your young hounds run a trail-scent.—I have no doubt that you would be glad to see them run over an open down, where you could so easily observe their action and their speed. I cannot think the doing of it once or twice could hurt your hounds; and yet as a sportsman I dare not recommend it to you. All that I can say is, that it would be less bad than entering them at hare. A cat is as good a trail as any; but on no account should any trail be used after your hounds are stooped to a scent. I know an old sportsman who enters his young hounds first at a cat, which he drags along the ground for a mile or two, at the end of which he turns out a badger, first taking care to break his teeth: he takes out about a couple of old hounds along with the young ones to hold them on. He never enters his young hounds but at vermin; for he says, "Train up a child in the way he should go, and when he is old he will not depart from it!"

Hounds ought to be entered as soon as possible, though the time must be uncertain, as it depends on the nature of the country in which they are. In corn countries hunting may not be practicable till the corn is cut down; but you may begin sooner in grass countries, and at any time in woodlands. "If (says Mr. Beckford) you have plenty of foxes, and *can afford to make a sacrifice of some of them* for the sake of making your young hounds steady, take them first where you have least riot, putting some of the steadiest of your old hounds among them. If in such a place you are fortunate enough to find a litter of foxes, you may assure yourself you will have but little trouble with your young hounds afterwards.—If, owing to a scarcity of foxes, you should stoop your hounds at hare, let them by no means have the blood of her; nor, for the sake of consistency, give them much encouragement. Hare-hunting has one advantage: the hounds are chiefly in open ground, where you can easily command them; but notwithstanding that, if foxes be in tolerable plenty, keep them to their own game.—Frequent hallooing is of use with young hounds; it keeps them forward, prevents their being lost, and hinders them from hunting after the rest. The oftener therefore that a fox is seen and hallooed, the better. I by no means, however, approve of much hallooing to old hounds; though it is true that there is a time when hallooing is of use, a time when it does hurt, and a time when it is perfectly indifferent: but long practice and great attention to hunting can only teach the application.

"Hounds at their first entrance cannot be encouraged too much. When they are become handy, love a scent, and begin to know what is right, it will then be soon enough to chastise them for what is wrong; in which case one severe beating will save a great deal of trouble. When a hound is flogged, the whipper-in should make use of his voice as well as his whip. If any be very unsteady, it will not be amiss to send them out by themselves when the men go out to exercise their horses. If you have hares in plenty, let some be found sitting, and turned

out before them; and you will find that the most riotous will not run after them. If you intend them to be steady from deer, they should often see deer, and then they will not regard them; and if after a probation of this kind you turn out a cub before them, with some old hounds to lead them on, you may assure yourself they will not be unsteady long."

It is proper to put the young hounds into the pack when they stoop to a scent, become handy, know a rate, and stop easily. A few only are to be put to the pack at a time; and it is not advisable even to begin this till the pack have been out a few times by themselves, and "are gotten well in blood." They should be low in flesh when you begin to hunt; the ground being generally hard at that time, so that they are liable to be shaken.—By hounds being *bandy*, our author means their being ready to do whatever is required of them; and particularly, when cast, to turn easily which way the huntsman pleases.

Mr. Beckford begins to hunt with his young hounds in August. The huntsman in the preceding months keeps his old hounds healthy by giving them proper exercise, and gets his young hounds forward; and for this purpose nothing answers so well as taking them frequently out. The huntsman should go along with them, get frequently off his horse, and encourage them to come to him:—too much restraint will frequently incline the hounds to be riotous. Our author frequently walks out his hounds among sheep, hares and deer. Sometimes he turns down a cat before them, which they kill; and when the time of hunting approaches, he turns out young foxes or badgers; taking out some of the most steady of his old hounds to lead on the young ones. Small covers and furze-brakes are drawn with them to use them to a halloo, and to teach them obedience. If they find improper game and hunt it, they are stopped and brought back; and as long as they will stop at a rate, they are not chastised. At such times as they are taken out to air, the huntsman leads them into the country in which they are designed to hunt; by which means they acquire a knowledge of the country, and cannot miss their way home at any time afterwards. When they begin to hunt, they are first brought into a large cover of his own, which has many ridings cut in it; and where young foxes are turned out every year on purpose for them. After they have been hunted for some days in this manner, they are sent to more distant covers, and more old hounds added to them. There they continue to hunt till they are taken into the pack, which is seldom later than the beginning of September; for by that time they will have learned what is required of them, and seldom give much trouble afterwards. In September he begins to hunt in earnest; and after the old hounds have killed a few foxes, the young ones are put into the pack, two or three couple at a time, till all have hunted. They are then divided; and as he seldom has occasion to take in more than nine or ten couple, one half are taken out one day, and the other the next, till they are steady.

To render fox-hunting complete, no young hounds should be taken into the pack the first season;—a requisite too expensive for most sportsmen. The pack should consist of about 40 couple of hounds, that have hunted one, two, three, four, or five seasons. The young pack should consist of about 20 couple of young hounds, and an equal number of old ones. They should have a separate establishment, and the two kennels should not be too near one another. When the season is over, the best of the young hounds should be taken into the pack, and the draught of old ones exchanged for them. Many must be bred to enable a sportsman to take in 20 couple of young hounds every season. It will always be easy to keep up the number of old hounds; for when your own draft is not sufficient, drafts from other packs may be obtained, and at a small expence.

When young hounds are hunted together for the first season, and have not a sufficient number of old ones along with them, it does more harm than good.

Kennel for HOUNDS. SEE KENNEL.

HOUNSLOW, a town of Middlesex, with a market on Thursday. It belongs to two parishes; the N. side of the street to Heston, and the S. side to Isleworth. It is situated on the edge of the heath of the same name, on which are some powder-mills, on a branch of the river Coln. On this heath James II. formed an encampment, after the suppression of the duke of Monmouth's rebellion, in order the more effectually to enslave his subjects; and here he first perceived the little dependence he could place on his army, by their rejoicings on receiving the news of the acquittal of the seven bishops. Hounslow is 10 miles W. by S. of London.

HOU-QUANG, a province of China, occupying nearly the centre of the empire: the river Yang-tsekiang traverses it from west to east; and divides it into two parts, the northern and southern. This province (the greater part of which is level, and watered by lakes, canals, and rivers) is celebrated for its fertility; the Chinese call it the store-house of the empire; and it is a common saying among them, that "the abundance of Kiang-si could furnish all China with a breakfast; but the province of Hou-quang alone could supply enough to maintain all its inhabitants." Some princes of the race of Hong-you formerly resided in this province; but that family was entirely destroyed by the Tartars when they conquered China. The people here boast much of their cotton cloths, simples, gold-mines, wax, and paper made of the bamboo-reed. The northern part of the province contains eight *fou*, or cities of the first class, and sixty of the second and third. The southern comprehends seven of the first class, and fifty-four of the second and third, exclusive of forts, towns, and villages, which are every where to be found.

HOURL, in chronology, an aliquot part of a natural day, usually a 24th, but sometimes a 12th. The origin of the word *bora*, or *ώρα*, comes, according to some authors, from a surname of the sun, the father of hours, whom the Egyptians call *Horus*. Others derive it from the Greek *ὁρίζω*, to terminate, distinguish, &c. Others from the word *ουρον* urine; holding, that Trifonegistus was the first that settled the division of hours, which he did from observation of an animal consecrated to Serapis, named *cynocephalus*, which makes water 12 times a day, and as often in the night, at equal intervals. An hour, with us, is a measure or quantity of time, equal to a 24th part of the natural day, or nycthemeron; or the duration of the 24th part of the earth's diurnal rotation. Fifteen degrees of the equator answer to an hour; though not precisely, but near enough for common use. It is divided into 60 minutes; the minute into 60 seconds, &c. The division of the day into hours is very ancient: as is shown by Kircher, *Oedipt. Ægypt.* tom. ii. parts ii. class. vii. c. 8.: though the passages he quotes from Scripture do not prove it. The most ancient hour is that of the 12th part of the day. Herodotus, lib. ii. observes, that the Greeks learned from the Egyptians, among other things, the method of dividing the day into twelve parts. The astronomers of Cathaya, &c. bishop Beveridge observes, still retain this division. They call the hour *chag*; and to each *chag* give a peculiar name, taken from some animal: The first is called *zetb*, "mouse;" the second, *chin*, "bullock;" the third, *zem*, "leopard;" the fourth, *mau*, "hare;" the fifth, *chin*, "crocodile, &c. The division of the day into 24 hours, was not known to the Romans before the first Punic war.—Till that time they only regulated their days by the rising and setting of the sun. They divided the 12 hours of their day into four, viz. *prime*, which commenced at six o'clock; *third*, at nine; *sixth*,

at twelve; and *none*, at three. They also divided the night into four watches, each containing three hours.

HOURS, *Horæ*, in the ancient mythology, were certain goddesses, the daughters of Jupiter and Themis; at first only three in number, Eunomia, Dice, and Irene; to which were afterwards added two more, Carpo and Thallote. Homer makes them the door-keepers of heaven. Ovid allots them the employment of harnessing the sun's horses; "*Jungere equos Titan velocibus imperat Horis*;" and speaks of them as standing, at equal distances, about the throne of Sol; "*—et, positæ spatiis equalibus, Horæ*." The poets represent them as dressed in fine coloured or embroidered robes, and gliding on with a quick and easy motion.

HOURS, *Horæ*, in the Romish church, are certain prayers performed at stated times of the day; as matins, vespers, lauds, &c. The lesser hours are, *prime*, *terce*, *sixth*, and *none*. They are called *hours*, or *canonical hours*, as being to be rehearsed at certain hours prescribed by the canons of that church, in commemoration of the mysteries accomplished at those hours. These hours were anciently also called *course*, *curfus*; F. Mabillon has a dissertation on them, intitled, *De Curfu Gallicano*. The first constitution enjoining the observation of the canonical *hours*, is of the ninth century, being found in a capitular of Heito bishop of Basil directed to his curates, importing that the priests shall never be absent at the canonical hours either by day or night.

Hour-Glass, a popular kind of chronometer or clepsydra, serving to measure the flux of time by the descent or running of sand out of one glass vessel into another. The best hour-glasses are those which, instead of sand, have egg-shells well dried in the oven, then beaten fine and sifted. Hour-glasses are much used at sea for reckoning, &c.

HOURIS, in modern history, is a name given by the Mahometans to those females that are designed for the faithful in paradise. These are not the same with whom they have lived on earth, but formed for this purpose with singular beauty and undecaying charms.

HOUSE, a habitation, or place built with conveniences for dwelling in. See ARCHITECTURE. Houses, amongst the Jews, Greeks, and Romans, were flat on the top for them to walk upon, and had usually stairs on the outside, by which they might ascend and descend without coming into the house. Each house, in fact, was so laid out, that it inclosed a quadrangular area or court. This court was exposed to the weather, and, being open to the sky, gave light to the house. This was the place where company was received, and for that purpose it was strewed with mats or carpets for their better accommodation. It was paved with marble or other materials, according to the owner's ability, and provided with an umbrella of vellum to shelter them from the heat and inclemencies of the weather. This part of their houses, called by the Romans *impluvium*, or *cava ædium*, was provided with channels to carry off the water into the common sewers. The top of the house was level, and covered with a strong plaster by way of terrace. Hither, especially amongst the Jews, it was customary to retire for meditation, private converse, devotion, or the enjoyment of the evening breezes.

The Grecian houses were usually divided into two parts, in which the men and women had distinct mansions assigned them. That assigned to the men was towards the gate, and called *Ανδρωνίτις*; the apartment of the women was the farthest part of the house, and called *Γυναικωνίτις*. Jews, Greeks, and Romans supposed their houses to be polluted by dead bodies, and to stand in need of purification.

A cheap, easy, and expeditious method of constructing houses fit for the recovery of the sick, has been described in the follow-

ing terms: The first thing to be done is to choose a dry and airy situation, on a gravelly or chalky soil if possible; upon this lay down the plan of your building, make one end of it face that quarter from whence the purest and healthiest winds may be expected to blow, of a breadth that can be conveniently roofed. Then, if boarding does not come so cheap, drive stakes, at about six feet distance from each other, into the ground, so as to stand about six feet above it; and, interlacing them with wattles, coat the wattles on the side next the weather with fresh straw; and make the roof in the same manner, but thicker, or of thatch in the usual way, with a hole at the very top of it, to open occasionally. Let the end of the building facing the wholesomest quarter lie open some feet back, so as to form a porch, where the convalescents may take the air without danger of any injury from the weather. A large chimney and kitchen grate may be erected at the other end. If the soil happens to be chalky or gravelly, you may hollow it four or five feet deep, within a foot or eighteen inches of the walls; but let the steps into this hollow lie far enough within the porch, that no water may get into it, and, if of chalk, that the steps may not grow slippery in wet weather. From time to time open the vent-hole at the roof; by means of which all the unwholesome infectious air, as being warmer, and consequently lighter, than that which is pure and wholesome, will be driven out by the rushing in of the fresh air: a purpose which the little openings, that may be left in the sides and roofs of such rude and hasty buildings, will, even of themselves, answer so well, as sufficiently to compensate any cold they may let in, even in the coldest months. Let the floor likewise be scraped three or four inches deep every five or six days, and what comes off removed to some distance. Halls of this kind, 50 feet long and 20 broad, cost but a trifle to build; yet, with these precautions (even without the addition of clean straw for every new patient to lie on, inclosed in clean washed sacks fit for the purpose, which come infinitely cheaper than the bare cleaning of flock or even feather beds, supposing it possible to wash such beds), proved of infinitely more advantage in the recovery of sick soldiers, than the low-roofed rooms of the farm-houses of the Isle of Wight, or even the better accommodations of Carisbrooke-castle in the same island, in which there perished four times the number of sick that there did in these temporary receptacles; which were first thought of by doctor Brocklesby, in consequence of some terrible infectious complaints arising from confined animal effluvia.

Is it not surprising, that we have not availed ourselves more of the above discovery in natural history, being, perhaps, the most important the moderns can boast of, in the most useful science, viz. the superior lightness of unwholesome and infectious air! The upper sashes in most houses, even of those who pretend to some knowledge in these matters, are generally immovable, by means of which no part of the foul air above the level of the lowest rail of the other sash's greatest rise can escape by the window; and, if it escapes by the doors, it is generally for want of a vent in the highest part of the roof, merely to accumulate in the upper story of the house, and add to the infection, which the great quantities of old furniture usually stored up there are of themselves but too apt to create, when care is not frequently taken to open the windows of it. Thus, the chief benefit to be expected from lofty rooms is in a great measure lost. Whereas, were the upper sashes contrived to come down, all the air might be easily changed, and that almost insensibly, by letting them down an inch or two. Nay, the upper sash might be often let entirely down with less danger or inconvenience from cold, than the lower thrown up the tenth part of an inch, though the doing of the former would be attended with infinitely more advantage to the health of the inhabitants than the latter. It is perhaps on this principle

that we are to account for the good health enjoyed by the poor who live crowded in damp cellars, and often with great numbers of rabbits, poultry, and even swine about them. These cellars are open to the street, with doors reaching from the floor to the very ceiling, but never so close at bottom or at top as to prevent a free circulation of air; in consequence of which, that all-vivifying fluid, as fast as it is spoiled by passing through the lungs of the inhabitants and their stock, or is infected by their insensible perspiration, excrements, &c. is driven out and replaced by the fresh air.

A patent was granted in July 1796, to Mr. Henry Walker, of Thurmaston in Leicestershire, for a curious invention of a method by which houses and other buildings of any description or dimensions may be erected in *one entire mass* or body, equally durable, and at a much less expence, especially in the articles of timber, lime, and workmanship, than houses on the usual construction. This invention is described by Mr. Walker in the following way: "In the first place I take an argillaceous earth or natural clay, which I select, examine, and purify, by the usual well-known methods, and compound the same with sand, or broken or pounded pottery, or brick, or coal-ashes, or charcoal, or, in short, with any other of those substances which experience has shewn to be adapted to form a good, firm, and durable brick, when properly baked; and I vary my composition according to the nature of the component parts themselves, and the purposes which they are intended to answer; but, for common constructions, I use the same proportions as brickmakers in general do. I then proceed to mix, knead, and incorporate the said materials, until the same are brought to the requisite firmness and tenacity for building; which is nearly such that the parts of any lump or mass of the same may be readily incorporated with, or joined to, any other similar mass, by moderate blows with a wooden mallet, and the occasional addition of a very small portion of water: I call this composition the prepared material.

"Secondly, I construct floors, walls, and all other buildings, after my said new invention, in such a manner that I can apply the power of fire, from wood, coal, charcoal, coak, or other combustible matters, not only to the external surfaces of the said floors, walls, and other parts, but also to the interior parts of such floors, walls, and other parts, by means of fires maintained in certain cavities left within the same: I call these cavities by the name of furnaces.

"Thirdly, with regard to the particular forms, dimensions, and relative positions of the said floors, walls, and other parts of buildings, and the furnaces left or formed within the same, together with the apertures or communications, for the purposes of ventilating the fires therein, of suffering the volatile matters to escape, and of converting the whole into one entire mass of brick by a due communication and continuance of heat, I do here proceed to explain the general principles and practice relating thereto, by describing the particular operations of constructing and baking a portion of a straight perpendicular wall, as follows; that is to say, the ground must be rendered solid, and the foundation laid in the usual manner; after which, I lay thereon a quantity of my prepared material herein before described, and do beat, ram, or otherwise press down the same to the thickness of about six inches; and in width corresponding with the intended dimensions of the wall, regulated by boards, or framing, or other suitable application to the outer surfaces. I then plant upright, at the distance of about thirty inches asunder, in the said layer or bed of prepared material, a number of cylindrical pieces of wood, of about nine inches in diameter each, and eighteen or more inches in length, to serve as moulds for the cavities of the furnaces; and between each of the said moulds I place, in the longitudinal direction of the wall, and parallel

to the horizon, a number of pipes, of wood or other materials, or rods, or other proper masses, of combustible or incombustible matter, for the purpose of forming communications between all the several furnaces, or as many of them as I think proper. In the next place, I proceed to form another layer or bed of the material to the same height, namely, about six inches, and dispose a number of pipes of wood or other materials, or rods, or other proper masses, of combustible or incombustible matter, for the purpose of forming communications between the furnaces as before. In this manner I construct the whole, or so much of the wall as I apprehend at the time may be conveniently formed, in the raw or unburned state; taking care, as the work advances, to raise the wooden cylinders or moulds of the cavities or furnaces, in order that a sufficient portion thereof shall remain above the surface of the work, to admit of the reception and proper fashioning of each subsequent bed or layer. Or otherwise, I form the communications between the furnaces by perforating the wooden moulds, in various places, at right angles to their respective axes; and through the said perforations I pass a bar of iron, or other material, which serves to connect three or more of the said furnace-moulds together, and, being afterwards withdrawn as the work proceeds, doth leave a cavity or cavities of communication, similar to those formed in the methods herein before described, by pipes, or rods, or other masses. And moreover I do, with a carpenter's auger, or other fit boring-tools, open such a number of horizontal or oblique apertures or flues into all the furnaces, and also into all the communication-pipes, or rods, or masses, or cavities, as aforesaid, as may be requisite for admitting a good communication on all sides with the open air. Or otherwise, in some instances, I form the said horizontal or oblique apertures or flues, by disposing a suitable number of taper rods in the work, along with the pipes, which rods I afterwards draw out.

"Fourthly, when the said wall, or so much thereof as may conveniently be constructed at one time in the raw material, is builded, I suffer the same to dry spontaneously. Or otherwise, I dry the same by moderate fires in the furnaces, which draw in the air by the lower apertures, and emit the heated air, vapour, flame, and other volatile matters, through the upper apertures; and afterwards, by stronger fires in the said furnaces, or by suitable applications of fire externally, or by both at the same time, I convert the whole into one entire mass of brick: and I must also observe, that, by occasional closing of the furnaces at top, or any of the other apertures, or by opening of the same or others of the said furnaces or apertures, in various parts, according to circumstances which the intelligent operator will readily apprehend, I do in such manner regulate the progress, communication, and effect of the heat, that the conversion into brick is regularly and uniformly made through the entire mass.

"Fifthly, I do farther state and declare, that the dimensions of the furnaces, the positions and relative distances of the pipes of communication and lateral apertures, and the thickness of the layers of the prepared material, are each and all susceptible of great variations, according to the nature of the said material, the activity of the fuel, the proposed solidity or figure of the work, and numerous other obvious circumstances; and that, accordingly, I do by no means confine myself to the dimensions here given by way of elucidation.

"Sixthly, I proceed to form the remaining or subsequent part or parts of such wall or other edifice, to be constructed as aforesaid, by applying additional portions of the prepared material in contact with that which hath been already baked; and, in this and every other part of my work, I place and dispose proper and suitable external and internal moulds, supports, frames, and other occasional contrivances, well known to builders, for sustaining works, or forming arches, or determining the figure

and positions of soft plastic substances. The explanation hereby given is sufficient to enable any builder, of moderate skill, to carry my said invention into full effect, as far as relates to walls, buttresses, arches, and other perpendicular or oblique parts of edifices; I therefore do proceed to describe the methods of forming floors and roofs, in the same strong, durable, and uniformly consistent material, forming one mass with the rest of the building, as follows; that is to say,

"Seventhly, I form the ground-floor of the prepared material, leaving hollow spaces between the supports beneath, for making fires to burn the same: these fires are ventilated by side apertures, and the flame and volatile products issue therefrom through numerous holes, previously made in the said floor, or otherwise. When the said floor is of considerable thickness I make furnaces therein, as before described with regard to walls constructed in this my new method, together with pipes of communication, and horizontal apertures and flues, as aforesaid.

"Eighthly, I form the first floor above the ground-floor, in such a manner, upon suitable temporary framing, that the upper surface shall be plane, and the lower surface thereof shall be concave; that is to say, either cylindrical, spherical, elliptical, or otherwise curved, with regard to the lower bounding-line of one or more of its vertical sections, that it may, when baked, support itself upon the principle of a low arch; and I do convert the said floor into brick, by means of fire in the apartments beneath, of which the flame and volatile products issue through numerous small apertures, designedly made in the said floor.

"Ninthly, I do construct and bake or burn the other floors above the first floor, and also the roof, in the same manner as the said first floor; and, in all and every case and cases of floors, roofs, platforms, staircases, and other horizontal or oblique parts of edifices, I do occasionally make use of, and dispose upon the surface, or within the mass of the prepared materials of which the same are made, such and so many bars of wood, or metal, or masses of stone, or baked earth, duly figured and disposed, as may be needful, either for preserving and sustaining the same in their proper figures respectively, until perfectly baked, or for giving stability and permanency to the same afterwards.

"Tenthly, and lastly, I do close the apertures, fill up the furnaces, amend the deficiencies or imperfections, adorn the walls, floors, ceilings, or other parts, internally and externally, by requisite applications of my prepared material, or otherwise, according to the taste and direction of the proprietor of such building or buildings as I may construct according to this my said new invention."

HOUSE is also used for one of the estates of the kingdom of Britain assembled in parliament. Thus we say, the house of lords, the house of commons, &c. See PEERS, COMMONS, &c.

HOUSE is also used for a noble family, or a race of illustrious persons issued from the same stock. In this sense we say, the house or family of the Stuarts, the Bourbons, the house of Hanover, of Austria, of Lorraine, of Savoy, &c.

HOUSE, in astrology, denotes the twelfth part of the heavens. The division of the heavens into houses, is founded upon the pretended influence of the stars, when meeting in them, on all sublunary bodies. These influences are supposed to be good or bad; and to each of these houses particular virtues are assigned, on which astrologers prepare and form a judgment of their horoscopes. The horizon and meridian are two circles of the celestial houses, which divide the heavens into four equal parts, each containing three houses; six of which are above the horizon and six below it; and six of these are called *eastern* and six *western houses*.

A scheme or figure of the heavens is composed of 12 triangles, all called *houses*, in which are marked the stars, signs,

and planets, so included in each of these circles. Every planet has likewise two particular houses, in which it is pretended that they exert their influence in the strongest manner; but the sun and moon have only one, the house of the former being Leo, and that of the latter Cancer.

The houses in astrology have also names given them according to their qualities. The first is the house of life: this is the ascendant, which extends five degrees above the horizon, and the rest below it. The second is the house of riches: the third, the house of brothers: the fourth, in the lowest part of the heavens, is the house of relations, and the angle of the earth: the fifth, the house of children: the sixth, the house of health: the seventh, the house of marriage, and the angle of the west: the eighth, the house of death: the ninth, the house of piety: the tenth, the house of offices: the eleventh, the house of friends: and the twelfth, the house of enemies.

Country-HOUSE is the *villa* of the ancient Romans (See *VILLA*), the *quinta* of the Spaniards and Portuguese, the *closerie* and *cassine* of the French, and the *vigna* of the Italians. 1. It ought always to have wood and water near it; these being the principal beauties of a rural seat. The trees make a far better defence than hills, as they yield a cooling and healthy air, shade during the heat of summer, and very much break the severities of the winter season. 2. It should not be situated too low, on account of the moisture of the air; and, on the other hand, those built on places exposed to the winds are expensive to keep in repair. In houses not above two stories high, and upon a good foundation, the length of two bricks, or 18 inches, for the heading course, will be sufficient for the ground-work of any common structure; and six or seven courses above the earth, to a water-table, where the thickness of the walls is abated or taken in, on either side the thickness of a brick, *viz.* two inches and a quarter. But for large and high houses of three, four, or five stories, with garrets, their walls ought to be three heading courses of bricks, or 28 inches at least, from the foundation to the first water-table; and at every story a water-table, or taking in, on the inside, for the summers, girders, and joists to rest upon, laid into the middle, or one quarter of the wall at least, for the better bond. But as for the partition-wall, a brick and half will be sufficiently thick; and for the upper stories, a brick length or nine inch brick will suffice.

Hot-HOUSE. See *STOVE* and *HYPOCAUSTUM*.

HOUSE-Breaking, or *Robbing*, is the breaking into and robbing a house in the day-time; the same crime being termed *BURGLARY* when done by night: both are felony without benefit of clergy.

HOUSEHOLD, the whole of a family considered collectively, including the mistress, children, and servants. But the household of a sovereign prince includes only the officers and domestics belonging to his palace. The principal officers of his majesty's household are, the lord steward, lord chamberlain of the household, the groom of the stole, the master of the great wardrobe, and the master of the horse.

The civil government of the king's house is under the care of the lord steward of the king's household; who being the chief officer, all his commands are observed and obeyed. His authority extends over all the other officers and servants, except those of his majesty's chapel, chamber, and stable, and he is the judge of all crimes committed either within the court or the verge. Under him are the treasurer of the household, the comptroller, cofferer, the master of the household, the clerks of the green cloth, and the officers and servants belonging to the accounting-house, the marshalsea, the verge, the king's kitchen, the household kitchen, the acatery, bake-house, pantry, buttery, cellar, pastry, &c. Next to the lord steward is the lord chamberlain of the household, who has under him the vice-chamberlain, the treasurer,

and comptroller of the chamber; 48 gentlemen of the privy chamber, 12 of whom wait quarterly, and two of them lie every night in the privy-chamber; the gentleman-usher, the grooms of the great chamber, the pages of the presence-chamber; the mace-bearers, cup-bearers, carvers, musicians, &c. See *Lord CHAMBERLAIN of the Household*.

The groom of the stole has under him the eleven other lords of the bed-chamber, who wait weekly in the bed-chamber, and by turns lie there a-nights on a pallet-bed; and also the grooms of the bed-chamber, the pages of the bed-chamber and back-stairs, &c. See *Groom of the Stole*. The master or keeper of the great wardrobe has under him a deputy, comptroller, clerk of the robes, brusher, &c. and a number of tradesmen and artificers, who are all sworn servants to the king. The master of the horse has under his command the equerries, pages, footmen, grooms, coachmen, farriers, saddlers, and all the other officers and tradesmen employed in his majesty's stables.

Next to the civil list of the king's court, is the military, consisting of the band of gentlemen pensioners, the yeomen of the guard, and the troops of the household; of which the two first guard the king above stairs.

When the king dines in public, he is waited upon at table by his majesty's cup-bearers, carvers, and gentlemen sewers; the musicians playing all the time. The dinner is brought up by the yeomen of the guard, and the gentlemen sewers set the dishes in order. The carvers cut for the king, and the cup-bearers serve him the drink with one knee on the ground, after he has first tasted it in the cover.

HOUSE and Window Duty, a branch of the king's extraordinary revenue. See *REVENUE*. As early as the Conquest mention is made in Domesday book of fumage or futage, vulgarly called *smoke-farthings*; which were paid by custom to the king for every chimney in the house. And we read that Edward the Black Prince (soon after his successes in France), in imitation of the English custom, imposed a tax of a florin upon every hearth in his French dominions. But the first parliamentary establishment of it in England was by statute 13 and 14 Car. II. c. 10. whereby an hereditary revenue of 2s. for every hearth, in all houses paying to church and poor, was granted to the king for ever. And, by subsequent statutes, for the more regular assessment of this tax, the constable and two other substantial inhabitants of the parish, to be appointed yearly (or the surveyor appointed by the crown, together with such constable or other public officer), were, once in every year, empowered to view the inside of every house in the parish. But, upon the Revolution, by stat. 1 W. and M. c. 10. hearth-money was declared to be "not only a great oppression to the poorer sort, but a badge of slavery upon the whole people, exposing every man's house to be entered into and searched at pleasure, by persons unknown to him; and therefore, to erect a lasting monument of their majesties' goodness, in every house in the kingdom the duty of hearth-money was taken away and abolished." This monument of goodness remains among us to this day: but the prospect of it was somewhat darkened, when in six years afterwards, by statute 7 W. III. c. 18. a tax was laid upon all houses (except cottages) of 2s. now advanced to a larger sum, and a tax also upon all windows, if they exceeded nine, in such house. These rates have been from time to time varied, being now extended to all windows exceeding six; and power is given to surveyors, appointed by the crown, to inspect the outside of houses, and also to pass through any house, two days in the year, into any court or yard, to inspect the windows there. The following convenient Table of the different rates of duty upon houses (exclusive of *windows*, which form a separate article of revenue) appears in *Kearseley's Tax-Tables*, which are published yearly in London.

Rent.	At per Pound.	Total per Yr.	Rent.	At per Pound.	Total per Yr.
<i>l.</i>	<i>s. d.</i>	<i>l. s. d.</i>	<i>l.</i>	<i>s. d.</i>	<i>l. s. d.</i>
1.	0 6	0 2 6	23	0 9	0 17 3
5	—	0 3 0	24	—	0 18 0
6	—	0 3 6	25	—	0 18 9
7	—	0 4 0	26	—	0 19 6
8	—	0 4 6	27	—	1 0 3
9	—	0 5 0	28	—	1 1 0
10	—	0 5 6	29	—	1 1 9
11	—	0 6 0	30	—	1 2 6
12	—	0 6 6	31	—	1 3 3
13	—	0 7 0	32	—	1 4 0
14	—	0 7 6	33	—	1 4 9
15	—	0 8 0	34	—	1 5 0
16	—	0 8 6	35	—	1 6 3
17	—	0 9 0	36	—	1 7 0
18	—	0 9 6	37	—	1 7 9
19	—	0 15 0	38	—	1 8 6
20	0 9	0 15 9	39	—	1 9 3
21	—	0 16 6	40	1 0	2 0 0
22	—				

And so on at the same rate of *1s.* in the pound for a rent of any amount.

The clauses relative to the house-tax are, 1. That offices, yards, gardens, coach-houses, brew-houses, wood-houses, wash-houses, &c. provided they all stand within the compass of one acre, belonging to the dwelling-house, must be valued with the dwelling-house, and be liable to the same duties. 2. Shops and warehouses are also liable, if attached to the dwelling-houses, except those of wharfingers. 3. No warehouse that is a distinct building is liable. 4. No house to be deemed occupied where one person is only left in charge of it. 5. Where houses are let in tenements, the landlords must pay the duty. 6. Halls and offices that pay other taxes are liable to this. 7. Farm-houses used only for husbandry, under 10*l.* per annum, are not chargeable; nor are houses for the reception of poor, or if not occupied by the owner, or rented by a tenant. 19 *Geo. 3. c. 15.*

HOUSE-LECK, in botany. See SEDUM and SEMPERVIVUM.

HOUSING, or HOUSE-LINE, in the sea-language, a small line, formed of three fine strands or twists of hemp, smaller than rope-yarn. It is chiefly used to seize blocks into their strops, to bind the corners of the sails, or to fasten the bottom of a sail to its bolt-rope, &c. See BOLT-ROPE.

HOUSING, or *Houffe*, a cover laid over the saddle of a horse, in order to save it from the weather, dirt, &c. The word is formed of the French *houffe*, which signifies the same thing; though it anciently denoted a kind of hood worn by country people. The cavaliers appeared with their embroidered housings.

HOUSING, among bricklayers, a term used for a brick which is warped, or is cast crooked or hollow in burning; in such a case, they say, it is *housing*.

HOUSTONIA, in botany; a genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 47th order, *Stellata*. The corolla is monopetalous and funnel-shaped; the capsule bilocular, dispersuous, superior.

HOU-TCHOU-FOU, a city of China, in the province of Tche-kiang. It is a city of the first class; and is situated on a lake, from which it takes its name. The quantity of silk manufactured here is almost incredible. To give some idea of it, we shall only say, that the tribute paid by a city under its jurisdiction, named *Ta-tsin bian*, amounts to more than 500,000

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taels or ounces of silver. Its district contains seven cities, one of which is of the second, and six of the third, class.

HOWARD (HENRY), earl of Surry, a soldier and a poet, the son and grandson of two lord treasurers, dukes of Norfolk, was born probably about the year 1520, and educated in Windsor-castle, with young Fitzroy earl of Richmond, natural son to king Hen. VIII. Wood says, from tradition, that he was some time a student at Cardinal College, Oxford. In his youth he became enamoured of the Fair Geraldine, whom his sonnets have immortalized. He fell a victim, as our English history relates, to the jealousy of the Seymours, who being rivals of the Norfolk family, and in favour with king Hen. VIII. accused him of aspiring to the crown. Surry, and his father the duke of Norfolk, were committed to the Tower, in December 1546; and on the 13th of January following, the former was tried at Guildhall by a common jury, and beheaded on Tower-hill on the 19th, nine days before the death of the king himself; who thus, that the measure of his crimes might be full, finished his life with the murder of his best subject. The accusations brought against this amiable and innocent young nobleman on his trial, were so extremely ridiculous, that one is astonished how it was possible, even in the most despotic reign, to find a judge and jury so pusillanimously villainous as to carry on the farce of justice on the occasion. Lord Surry was first interred in the church of All-hallows, Barking, near Tower-hill; and afterwards, in the reign of king James I. his body was removed to Farningham in Suffolk, by his son Henry, earl of Northampton.

As to the character of this unfortunate earl, all our poets have sung his praise. Mr. Walpole begins his anecdotes of Surry with these words: "We now emerge from the twilight of learning to an almost classic author, that ornament of a boisterous, yet not unpolished court, the earl of Surry, celebrated by Drayton, Dryden, Fenton, Pope, illustrated by his own muse, and lamented for his unhappy death: a man (as Sir Walter Raleigh says) no less valiant than learned, and of excellent hopes." Leland calls him the conscript enrolled heir of Sir Thomas Wyatt, the elder, in his learning and other excellent qualities; and the author of *The Art of English Poetry* says, that the earl of Surry, and Sir Thomas Wyatt, may be justly called the *reformers of our poetry and style*. His poems were published in 1557, 12mo; and in 1565, 1574, 1585, 1587, 8vo. Several of the sonnets are by Sir Thomas Wyatt and others.

HOWARD (John), Esq. a man remarkable for philanthropy and humanity, was the son of a reputable tradesman in St. Paul's church-yard. He was born about the year 1725 or 1726; and at a proper age was put apprentice to Mr. Nathaniel Newnham, a wholesale grocer in Watling-street. His father died, leaving only this son and a daughter, to both of whom he bequeathed handsome fortunes; and by his will directed that his son should not be considered of age till he was five-and-twenty. His constitution was thought very weak, and his health appeared to have been injured by the necessary duties of his apprenticeship; and therefore, at the expiration of it, he took an apartment in a lodging-house in Church-street, Stoke Newington, Middlesex; but not meeting with the tenderest treatment there, he removed to another lodging house in the same street, which was kept by a widow lady, Mrs. Sarah Lardeau, a worthy sensible woman, but an invalid. Here he was nursed with so much care and attention, that he resolved to marry his landlady out of gratitude for her kindness. In vain she expostulated with him upon the extravagance of such a proceeding, he being about 28 and she about 51 years of age, and 20 years older in constitution: but nothing could alter his resolution, and they were privately married about the year 1752. She was possessed of a small fortune, which he presented to her sister. During

his residence at Newington, the minister of the dissenting meeting-house there resigned his office, and a successor was elected; and Mr. Howard, who was bred a dissenter, and steadfastly adhered all his life to that profession, proposed to purchase the lease of a house near the meeting-house, and to appropriate it as a parsonage-house for the use of the minister for the time being, and contributed 50*l.* for that purpose. His wife died November 10, 1755, aged 54; and he was a sincere and affectionate mourner for her death. About this time, it is believed, he was elected F. R. S. In the year 1756 he had the fortune to experience some of the evils which it afterwards became the business of his life to redress. He embarked that year in a Lisbon packet, the *Hanover*, in order to make the tour of Portugal; when the vessel was taken by a French privateer. "Before we reached Brest (says he in his publication *On Prisoners*, p. 11.) I suffered the extremity of thirst, not having for above 40 hours one drop of water, nor hardly a morsel of food. In the castle at Brest I lay six nights upon straw; and observing how cruelly my countrymen were used there and at Morlaix, whither I was carried next, during the two months I was at Carhaix upon parole, I corresponded with the English prisoners at Brest, Morlaix, and Dinnan: at the last of those towns were several of our ship's crew, and my servant. I had sufficient evidence of their being treated with such barbarity, that many hundreds had perished, and that 36 were buried in a hole at Dinnan in one day. When I came to England, still on parole, I made known to the commissioners of sick and wounded seamen the sundry particulars, which gained their attention and thanks. Remonstrance was made to the French court: our sailors had redress; and those that were in the three prisons mentioned above, were brought home in the first cartel ships. Perhaps (adds Mr. Howard) what I suffered on this occasion increased my sympathy with the unhappy people whose case is the subject of this book."

He afterwards, it is said, made the tour of Italy; and at his return settled at Brokenhurst, a retired and pleasant villa in the New Forest, near Lymington in Hampshire, having, April 25, 1758, married a daughter of Edward Leeds, Esq. of Croxton, Cambridgeshire, king's serjeant. This lady died in 1765, in child-bed, of her only child, a son, who unfortunately became lunatic. After her death, Mr. Howard left Lymington, and purchased an estate at Cardington, near Bedford.

"While he lived here in retirement (says Mr. Palmer, in his funeral discourse), it was his meat and drink to make his neighbours happy. His neat but humble mansion was ever hospitable to a few select friends, but was never the scene of riot or luxurious banqueting. Though polite to all, he neither sought nor admitted the company of the profligate, however distinguished by rank or fortune. His charity had no bounds, except those of prudence; and was not more commendable for the extent of it, than for the manner in which it was exercised. He gave not his bounty to countenance vice and idleness, but to encourage virtue and industry. He was singularly useful in furnishing employment for the labouring poor of both sexes, at those seasons when a scarcity of work rendered their situation most compassionate. And at other times, though never inattentive to the tale of woe, he was not easily imposed upon by it, but made himself acquainted with the case. He had indeed a general acquaintance with the cases and characters of the poor around him, and made it his business to visit the abodes of affliction. In circumstances of bodily disorder he often acted the part of a physician as well as a friend. But his kindness was not confined to the bodies of his fellow-creatures, it extended to their spiritual and immortal part. He carefully watched over the morals of his neighbourhood, and used his advice, his admonitions, and influence, to discountenance immorality of all kinds, and to promote the knowledge

and practice of religion. As a most effectual means to this great end, he provided for the instruction of poor children, by erecting and supporting schools, which he carefully superintended. In short, he was a universal blessing to the village where he resided, in every part of which are to be seen the pleasing monuments of his munificence and taste. His liberality extended also to adjacent places, in which there are many who will call him blessed. Nor was it confined to persons of his own religious persuasion, but comprehended the necessitous and deserving of all parties; while he was particularly useful in serving the interest of the Christian society to which he belonged. What wonder if such a man were universally beloved? Was it possible he should have an enemy? One however he had (and I never heard of more), an idle and dissolute wretch, who, having been often reproved by him for his vices, formed the desperate resolution to murder him as he was going to public worship, which he almost always did on foot. But Providence remarkably interposed to preserve so valuable a life, by inclining him that morning to go on horseback a different road."

But the sphere in which he had hitherto moved was too narrow for his enlarged mind. Being named in 1773 to the office of sheriff of Bedfordshire, from that time his scene of usefulness was extended. His office, as he himself observes, brought the distress of prisoners more immediately under his notice. A sense of duty induced him personally to visit the county-jail, where he observed such abuses; and such scenes of calamity, as he had before no conception of; and he soon exerted himself to procure a reform. With a view to obtain precedents for certain regulations which he purposed, he went to inspect the prisons in some neighbouring counties. But finding in them equal room for complaint and commiseration, he determined to visit the principal prisons in England. The farther he proceeded, the more shocking were the scenes presented to his view; which induced him to resolve upon exerting himself to the utmost, to accomplish a general reform in these horrid places of confinement; considering it as of the highest importance, not only to the wretched objects themselves, but to the community at large. Upon this subject he was examined in the house of commons in March 1774, when he had the honour of their thanks. This encouraged him to proceed in his design. He revisited all the prisons in the kingdom, together with the principal houses of correction. He, also in 1775 enlarged his circuit by going into Wales, Scotland, and Ireland, where he found the same need of reformation.

One grand object which he had in view was, to put a stop to the *jail fever*; which raged so dreadfully in many of the prisons, as to render them to the last degree offensive and dangerous; a disease by which more had been taken off than by the hands of the executioner; and which, in several instances, had been communicated from the prisoners into the courts of justice, and had proved fatal to the magistrates and judges, and to multitudes of persons who attended the trials, as well as to the families of discharged felons and debtors. Another end he proposed was, to procure the immediate release of prisoners, who, upon trial, were acquitted, but who often continued long to be unjustly detained for want of being able to pay the accustomed fees; as also to abolish many other absurd and cruel usages which had long prevailed. But the great object of all was, to introduce a thorough reform of morals into our prisons; where he had found the most flagrant vices to prevail in such a degree, that they were become seminaries of wickedness and villainy, and the most formidable nuisances to the community; in consequence of the promiscuous intercourse of prisoners of both sexes, and of all ages and descriptions; whereby the young and less experienced were ini-

tiated, by old and hardened sinners, into all the arts of villainy and the mysteries of iniquity; so that, instead of being reformed by their confinement (which should be the chief end of punishment), those that were discharged became more injurious to society than before.

In order to the attainment of these great objects, Mr. Howard spared no pains nor expence, and cheerfully exposed himself to much inconvenience and hazard; particularly from that malignant distemper, of which he saw many dying in the most loathsome dungeons, into which none, who were not obliged, besides himself, would venture. "I have been frequently (says Mr. Howard) asked what precautions I used to preserve myself from infection in the prisons and hospitals which I visit. I here answer, next to the free goodness and mercy of the Author of my being, temperance and cleanliness are my preservatives. Trusting in divine Providence, and believing myself in the way of my duty, I visit the most noxious cells; and while thus employed, I fear no evil. I never enter an hospital or prison before breakfast; and in an offensive room, I seldom draw my breath deeply."

His laudable endeavours he had the pleasure to see, in some instances, crowned with success; particularly in regard to the healthiness of prisons, some of which were rebuilt under his inspection. Through his interposition also, better provision has been made for the instruction of prisoners, by the introduction of bibles and other pious books into their cells, and a more constant attendance of clergymen. The gaolers likewise have, by act of parliament, been rendered incapable of selling strong liquors, which had been the source of much drunkenness and disorder. But a minute detail of particulars is not to be expected here; for these the reader is referred to Mr. Howard's publications, which show that much is yet wanting.

But in order to a more general and happy regulation, and the reformation of criminals, he determined to visit other countries, to see the plans there adopted; in hope of collecting some information which might be useful in his own country. For this purpose he travelled into France, Flanders, Holland, Germany, and Switzerland: afterwards through the Prussian and Austrian dominions. He visited also the capitals of Denmark, Sweden, Russia, and Poland, and some cities in Portugal and Spain. In all these expensive and hazardous journeys, he denied himself the usual gratifications of travellers, and declined the honours which were offered him by persons of the first distinction, applying himself solely to his one grand object. To him the inspection of a jail, or hospital, was more grateful than all the entertainments of a palace. With what astonishment and gratitude he was received by their miserable inhabitants may easily be imagined, since while he made observations on their situation, he meditated their relief; and many distressed prisoners abroad, as well as at home, partook of his bounty, and some were liberated by it; for he considered all of every nation, and people, and tongue, as brethren. Nor was he sparing of advice, or of reproof, as he saw occasion, to persons of rank and influence, whereby the miseries of their countrymen might be relieved. As he courted the favour of none, neither did he fear the frowns of any; but, with a manly freedom and a christian fortitude, spoke his mind to crowned heads (particularly the late emperor of Germany) in a manner to which they were not accustomed; which, however, in a person of such disinterested views, procured him reverence and esteem, and in some instances proved effectual for relieving the miserable and oppressed. On his return, he published in 1777, "The State of the Prisons in England and Wales, with Preliminary Observations, and an Account of some Foreign Prisons," 4to. And in 1778 he took a third journey through the Prussian and Austrian domi-

nions, and the free cities of Germany, and likewise extended his tour through Italy, and revisited some of the countries he had before seen. The observations he made in this tour were published in an Appendix, 1780; containing also some remarks respecting the management of prisoners of war, and the hulks on the Thames. But wishing to acquire some further knowledge on the subject, he in 1781 again visited Holland and some cities in Germany. He visited also the capitals of Denmark, Sweden, Russia, and Poland; and in 1783 some cities in Portugal and Spain, and returned through France, Flanders, and Holland. The substance of all these travels was afterwards thrown into one narrative, which was published in 1784. He also published a curious account of the Bastile, in 8vo. that infamous French prison happily now no more.

His travels and exertions, however, were not yet at an end. He conceived a further design, which was to visit the principal lazarettos in France and Italy, in order to obtain information concerning the best methods to prevent the spreading of the plague, with a view to apply them with respect to other infectious disorders. Not gaining all the satisfaction here which he wished for, he proceeded to Smyrna and Constantinople, where that most dreadful of human distempers actually prevailed, "pleasing himself (as he said) with the idea of not only learning, but of being able to communicate somewhat to the inhabitants of those distant regions." In the execution of this design, though he was so much exposed to danger, and actually caught the plague, "that merciful Providence (as he himself piously remarks) which had hitherto preserved him, was pleased to extend his protection to him in this journey also, and to bring him home once more in safety." In his return he revisited the chief prisons and hospitals in the countries through which he passed; and afterwards went again to Scotland, and then to Ireland, where he proposed a new and very important object; namely, to inspect the Protestant Charter Schools, in some of which he had before observed shameful abuses, which he had reported to a committee of the Irish house of commons. In this more extensive tour, he took a particular account of what he observed amiss in the conduct of this noble charity, with a view to a reformation, and not without considerable success. In the course of these journeys, particular cities and communities were not unmindful to pay him proper respect. At Dublin, he was created by the university a Doctor of Laws; and the city of Glasgow and the town of Liverpool did honour to themselves by enrolling him among their members. Upon his return home, having again inspected the prisons in England, and the hulks on the Thames, to see what alterations had been made for the better (which he found to be very considerable, though yet imperfect), he published the result of his last laborious investigations, in "An Account of the principal Lazarettos in Europe, with various Papers relative to the Plague, together with further Observations on some Foreign Prisons and Hospitals, and Additional Remarks on the present State of those in Great-Britain and Ireland," with a great number of curious plates. The work likewise contained Observations on Penitentiary Houses, which had been encouraged by act of parliament, for the correction and reformation of criminals, of which he and Dr. Fothergill had been nominated by the king to be superintendants. Beside these, he published the Grand Duke of Tuscany's "New Code of Criminal Law, with an English Translation;" and of all his publications he gave away a vast number of copies among his acquaintance, in the most liberal manner. His laying open the horrors of despotism in a neighbouring country had very nearly exposed him to the sufferings of them; and had it not been for the timely notice of our ambassador, he had ended his days in the Bastile.

Not satisfied, however, with what he had already done, he

concludes his "Account of Lazarettos" with announcing his intention again to quit his country, for the purpose of revivifying Russia, Turkey, and some other countries, and extending this our in the East. "I am not insensible (says he) of the dangers that must attend such a journey. Trusting, however, in the protection of that kind Providence which has hitherto preserved me, I calmly and cheerfully commit myself to the disposal of unerring wisdom. Should it please God to cut off my life in the prosecution of this design, let not my conduct be uncandidly imputed to rashness or enthusiasm, but to a serious deliberate conviction that I am pursuing the path of duty, and to a sincere desire of being made an instrument of more extensive usefulness to my fellow-creatures than could be expected in the narrower circle of a retired life." Accordingly, to the great concern of his friends, he set out in summer 1789 on this hazardous enterprise; the principal object of which was to administer Dr. James's Powder, a medicine in high repute at home, in malignant fevers, under a strong persuasion that it would be equally efficacious in the plague. In this second tour in the East "it *did* please God to cut off his life:" for, having spent some time at Cherson, a new settlement of the empress of Russia, in the mouth of the Dnieper or Borysthenes, toward the northern extremity of the Black Sea, near Oczakow, he caught, in visiting the Russian hospital of that place, or as some say a young lady who was ill of the same complaint, a malignant fever, which carried him off on the 20th of January, after an illness of about twelve days: and after having been kept, according to his express directions to his servant, five days, he was buried, by his own desire, in the garden of a villa in the neighbourhood, belonging to a French gentleman from whom he had received great civilities, by his faithful servant who had attended him on his former journeyings, and whom he expressly enjoined not to return home till five weeks from his death. While absent on his first tour to Turkey, &c. his character for active benevolence had so much attracted the public attention, that a subscription was set on foot to erect a statue to his honour in St. Paul's Cathedral, and 1500 l. was quickly subscribed for that purpose. But some of those who knew Mr. Howard best, never concurred in the scheme being well assured that he would neither countenance nor accede to it; and in consequence of two letters from Mr. Howard himself to the subscribers, the design was laid aside. It has, however, been effected since his death: and surely, of all the statues or monuments ever erected by public gratitude to illustrious characters either in ancient or modern times, none was ever erected in honour of worth so genuine and admirable as his—who devoted his time, his strength, his fortune, and finally sacrificed his life, in the pursuits of humanity:—who, to adopt the expressive words of Mr. Burke, in his speech at Guildhall in Bristol, in 1780, "visited all Europe [and the East], not to survey the sumptuousness of palaces, or the stateliness of temples; not to make accurate measurements of the remains of ancient grandeur, nor to form a scale of the curiosity of modern art: not to collect medals, or to collate manuscripts; but to dive into the depth of dungeons; to plunge into the infection of hospitals; to survey the mansions of sorrow and of pain; to take the gauge and dimensions of misery, depression, and contempt; to remember the forgotten; to attend to the neglected; to visit the forsaken; and to compare and collate the distresses of all men in all countries. His plan is original; and it is as full of genius as it is of humanity. It is a voyage of discovery, a circumnavigation of charity; and already the benefit of his labour is felt more or less in every country."

HOWDEN, a town in the East Riding of Yorkshire, 180 miles from London, stands on the north side of the Ouse, has a market on Saturdays, and four fairs in the year. Here was

formerly a collegiate church of five prebendaries, erected in the last century but one; adjacent to which the bishops of Durham, who possess many estates hereabouts with a temporal jurisdiction, have a palace. One of them built a very tall steeple to the church here, whither the inhabitants might retire in case of inundations; to which it is very liable from the great freshes that come down the Ouse sometimes at ebb. This part of the county is from hence called Howdenshire, and is watered by a conflux of several large rivers that fall into the Humber. At Howdendike is a ferry over the Ouse.

Lord HOWE's Island, a small island in the neighbourhood of New South Wales, discovered on February 17, 1788, S. lat. 31. 36. E. long. 159. 04. It is of an arched figure, lying from north-west to south-east, the two extremities including a space of about six miles, though, by reason of the curved figure of the island itself, it is near seven in length. It is deeply indented on the middle of the eastern part by a bay named Rose's Bay, and on the opposite and western part has another named Prince William Henry's Bay; so that the whole has the appearance of two islands joined together by an isthmus, which in some places is not above half a mile broad. On the southern part of that division which lies most to the northward are two considerable bays, named Callam's and Hunter's Bay; and on the south-western part of the other are two high mountains, the most southerly named Mount Gower, and the other Mount Lidgbird. The convex part of the island lying towards the north-east, and the concave side towards the opposite quarter, is terminated by two points named Point King and Point Philip. No fresh water was found on the island; but it abounds with cabbage-palms, mangrove, and manchineel trees, even up to the summits of the mountains. There are plenty of ganets, and a land fowl of a dusky brown colour, with a bill about four inches long, and feet like those of a chicken. These were found to be remarkably fine meat, and were very fat. There are many large pigeons, and the white birds found in Norfolk Island were also met with in this place. The bill of this bird is red, and very strong, thick, and sharp pointed. Great numbers of fine turtle frequent this island in summer, but go to the northward in winter. These, it was imagined, would prove of great service to the colony at Port Jackson; but, from some cause or other, it appears they have hitherto been disappointed. Plenty of fish were caught by a hook and line. At the distance of about four leagues from Lord Howe's Island is a very remarkable and high rock, to which the name of Ball's Pyramid has been given. This island may be approached without danger; but about four miles from the south-west part of the pyramid there is a very dangerous rock, which shows itself above the surface of the water, and appears not to be larger than a boat. The southern part of the island is lined with a sandy beach, which is guarded against the sea by a reef of coral rock, at the distance of half a mile from the beach, through which there are several small openings for boats; but there is nowhere a greater depth of water within the reef than four feet. By the account of Mr. Watts, who visited this island in his return from Port Jackson, the isthmus which joins the two parts has evidently been overflowed, and the island disjoined, as in the very centre the men saw large beds of coral rocks and great quantities of shells; and on the east, which seems in general to be the weather-side, the sea has thrown up a bank of sand from 25 to 30 feet high, which serves as a barrier against future inundations. The island also appears to have suffered by volcanic eruptions, as great quantities of pumice-stones and other matters of that kind were found upon it. Mr. Austin also found the whole reef which shelters the west bay a burnt-up mass. The time he visited the island was that of the incubation of the ganets, of which there were then prodigious numbers,

their nests being only hollows made in the sand, there not being any quadrupeds on the island to disturb them. Besides the large pigeons already mentioned, they met with beautiful parrots and parroquets; a new species of the coot, as well as of the rail and magpie. They found likewise a very beautiful small bird of a brown colour with a yellow breast, and yellow on the wing, which seemed to be a species of humming-bird. They found also a black bird like a sheerwater, having a hooked bill; and which burrows in the ground. The only insects met with here were the common earth-worm and ants; which last were in great plenty. Besides the trees already mentioned, they found several esculent vegetables, as scurvy-grass, celery, spinach, radish, and samphire.

HOVELL (JAMES), a voluminous writer of the 17th century, supported himself many years by writing and translating of books. Though he had been a zealous loyalist, he afterwards flattered Cromwell; yet on the restoration he was made historiographer to the king, being the first in England who enjoyed that title. He died in 1666.

HOWITZ, or HOWITZER, a kind of mortar, mounted upon a field-carriage like a gun. The difference between a mortar and a howitz is, that the trunnions of the first are at the end, and at the middle in the last. The invention of howitzers is of much later date than mortars, for they really had their origin from them. The constructions of howitzes are as various and uncertain as those of mortars, excepting the chambers, which are all cylindric. They are distinguished by the diameter of the bore; for instance, a ten inch howitz is that the diameter of which is 10 inches; and so of the smaller ones.

HOWTH, a promontory which forms the northern entrance of the bay of Dublin, having a small village about seven miles north-east from that city in the province of Leinster. It gives title of earl to the family of St. Lawrence, who were so called from a victory obtained by them over the Irish on St. Lawrence's day 1177, their former name being Tristram; and this place has continued in possession of the family above 600 years. N. lat. 53. 21. W. long. 6. 22. The shores off this hill are rocky and precipitous, affording, however, a few harbours for small craft. It was formerly called Ben-hedar, i. e. "the Birds promontory;" and celebrated for having Dun Criomthan, or the rath or royal palace of Criomthan erected on it, he having been chief or king of that district, and memorable for making several successful descents on the coast of Britain against the Romans in the time of Agricola. Howth, though now stripped of trees, was formerly covered with venerable oaks, and was a seat of the Druids; one of their altars still remains in a sequestered valley on the east side of the hill. The mansion-house is built in form of a castle, and was probably erected by Sir Armoricus Tristram. Near the house stands the family chapel, and on the western shore are the ruins of St. Mary's church, with some ancient monuments of lord Howth's ancestors. Due west of Howth house are the ruins of St. Fenton's church.

HOXTER, a town of Germany, in Westphalia, seated on the river Weser, 27 miles N. E. of Paderborn. E. long. 9. 39. N. lat. 51. 50.

HOY, a small vessel, chiefly used in coasting, or carrying goods to or from a ship, in a road or bay, where the ordinary lighters cannot be managed with safety or convenience. It would be very difficult to describe, precisely, the marks of distinction between this vessel and some others of the same size, which are also rigged in the same manner; because what is called a *boy* in one place, would assume the name of a *sloop* or *smack* in another; and even the people who navigate these vessels, have, upon examination, very vague ideas of the marks by which they are distinguished from those above mentioned.

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In Holland, the hoy has two masts; in England, it has but one, where the main-sail is sometimes extended by a boom, and sometimes without it. Upon the whole, it may be defined a small vessel, usually rigged as a sloop, and employed for carrying passengers and luggage from one place to another, particularly on the sea-coast.

HOY, one of the Orkney islands, situated between the island of Pomona and the north coast of Caithnessshire. It is about 10 miles long. On this island, beside the great conic hill of Hoyhead, which is a sea-mark, there is a stupendous rock, called the Beary, where a bird, here named the layer, supposed to be a species of penguin, is found. It is about the size of a small duck, remarkably fat, and esteemed by many a great delicacy. These birds burrow in the rabbit-holes. The person employed in taking the young is usually let down by a rope from the top of the precipice. In this island too, in a gloomy valley, is an entire stone, 36 feet long, and 18 broad, called the Dwarfie stone. It is hollow within, having the form of a bed and pillow cut in the stone. It is supposed to have been once the habitation of a hermit. W. long. 3. 20. N. lat. 58. 56.

HOYE, a town of Germany, in Westphalia, capital of a county of the same name, and subject to the elector of Hanover. It is seated on the river Weser, 43 miles N. W. of Zell. E. long. 9. 6. N. lat. 52. 57.

HRADISCH, a town of Germany, in Moravia, seated on an island in the river Morava, 30 miles S. E. of Olmutz, and 30 E. of Brinn. E. long. 17. 53. N. lat. 49. 0.

HUA, or KAHUA, a large town of Asia, capital of Cochin China, with a handsome palace, where the king commonly resides. It is seated in a beautiful plain, and divided into two parts by a large river. The inhabitants are sincere, good-natured, and civil to strangers, and their religion is like that of China. They all blacken their teeth, thinking it a shame to have them white, like dogs; and they wear their nails very long. There is also a garrison kept here, and there are a few Christians. E. lon. 105. 5. N. lat. 17. 40.

HUAHINE, one of the SOCIETY-ISLANDS, in the South Sea, situated in S lat. 16. 43. W. long. 150. 52. and is about seven or eight leagues in compass. Its surface is hilly and uneven, and it has a safe and convenient harbour. It was first discovered by Captain Cook in 1769. It is divided by a deep inlet into two peninsulas connected by an isthmus, which is entirely overflowed at high water. From the appearance of its hills it may be concluded, that the country has at some period or other been the seat of a volcano. The summit of one of them had much the appearance of a crater, and a blackish spongy earth was seen upon one of its sides, which seemed to be lava; and the rocks and clay every where had a burnt appearance. The island is plentifully supplied with water by many rivulets which descend from the mountains and broken rocks. The inhabitants are nearly as fair as Europeans; and their conduct is bolder than that of the inhabitants of the other Society-Islands. They are a stout large-made people, some of the tallest being six feet three inches in height; they are extremely indolent, and seem to have as little curiosity as fear. The dogs are in great favour with all their women, "who could not have caressed them (says Mr. Forster) with a more ridiculous affection if they had been European ladies of fashion." Here was seen a middle-aged woman, whose breasts were full of milk, offering them to a little puppy who had been trained up to suck them. The sight disgusted those who saw it so much, that they could not forbear expressing their dislike to it: but the woman smiled, and told them that she allowed young pigs to do the same. It appeared afterwards that this woman had lost her child. Some of the gentlemen were present at a dramatic entertainment on this island: the piece represented a girl running away from her parents;

and seemed to be levelled at a female passenger who had come in Captain Cook's ship from Otaheite, and who happened to be present at the representation. It made such an impression on the girl, that the gentlemen could scarce prevail upon her to see the piece out, or to refrain from tears while it was acting. It concluded with the reception she was supposed to meet with from her friends, which was made out not to be a very agreeable one.—These people introduce extempore pieces upon occasion; and it is most probable that this was meant as a satire upon the girl above mentioned, and to discourage others from acting in the same manner.

HUBER (ULRIC), one of the greatest civilians in the 17th century, was born at Dockum in 1636. He became professor of law at Franeker; and wrote, 1. A treatise *De jure civitatis*. 2. *Jurisprudentia Frisica*. 3. *Specimen philosophiæ civilis*. 4. *Institutiones historiæ civilis*; and several other works, which are esteemed. He died in 1694.

HUBERT Sr. a town of the Austrian Netherlands, in Luxemburg, with a handsome abbey. It is 20 miles N. E. of Bouillon, and 150 N. E. of Paris. Lon. 5. 12. E. Lat. 50. 0. N.

HUBNER (JOHN), a learned geographer of Germany, taught geography at Leipzig and Hamburg with extraordinary reputation; and died at Hamburg in 1732, aged 63. His principal work is a Geographical treatise, printed at Basil in 1746, in 6 vols. 12mo.

HUDSON (HENRY), an eminent English navigator, who, about the beginning of the last century, undertook to find out a passage by the north-east or north-west to Japan and China. For this purpose he was four times fitted out: he returned three times unsuccessful; but in the last voyage, in 1610, being persuaded that the great bay to which his name has been since given, must lead to the passage he sought, he wintered there, to prosecute his discovery in the spring. But their distresses during the winter producing a mutiny among his men, when the spring arrived, they turned him, with his son and seven sick men, adrift in his own shallop, and proceeded home with the ship. As Hudson and his unhappy companions were never heard of afterward, it is to be supposed they all perished.

HUDSON (JOHN), a very learned English critic, born in 1662. He distinguished himself by several valuable editions of Greek and Latin authors, and in 1701 was elected head keeper of the Bodleian library at Oxford. In 1712 he was appointed principal of St. Mary's Hall, through the interest of the famous Dr. Ratchiffe; and it is said that the university of Oxford is indebted for the most ample benefactions of that physician to Dr. Hudson's solicitations. He died in 1719, while he was preparing for publication a catalogue of the Bodleian library, which he had caused to be fairly transcribed in six folio volumes.

HUDSON'S BAY, a large bay of N. America, lying between 51° and 69° N. latitude, and discovered, in 1610, by Mr. Henry Hudson. This intrepid mariner, in searching after a N. W. passage to the S. Sea, discovered three straits, through which he hoped to find out a new way to Asia by America. He had made two voyages before on the same adventure; the first in 1607, and the second in 1608. In his third and last, in 1610, he entered the straits that lead into this new Mediterranean, the bay known by his name; coasted a great part of it, and penetrated to 80 degrees and a half to the heart of the frozen zone. His ardour for the discovery not being abated by the difficulties he struggled with in this empire of winter, and world of frost and snow, he staid here till the ensuing spring, and prepared, in the beginning of 1611, to pursue his discoveries; but his crew, who suffered equal hardships, without

the same spirit to support them, mutinied, seized him and seven of those who were most faithful to him, and committed them to the fury of the icy seas in an open boat. Hudson and his companions were either swallowed up by the waves, or, gaining the inhospitable coast, were destroyed by the savages; but the ship and the rest of the men returned home. Other attempts toward a discovery were made in 1612 and 1667; and a patent for planting the country, with a charter for a company, was obtained in 1670. In 1746, captain Ellis wintered as far north as 57 degrees and a half: and captain Christopher attempted farther discoveries in 1761. But beside these, and the late voyages, which satisfy us that we must not look for a passage on this side of the latitude 67 degrees north we are indebted to the Hudson's Bay company for a journey by land, which throws much additional light on this matter, by affording what may be called demonstration, how much farther north, at least in some parts of their voyage, ships must go, before they can pass from one side of America to the other. The northern Indians, who come down to the company's factories to trade, had brought to the knowledge of our people a river, which, on account of much copper being found near it, had obtained the name of Coppermine River. The company, being desirous of examining into this matter with precision, directed Mr. Hearne, a young gentleman in their service, to proceed over land, under the convoy of those Indians, for that river; which he had orders to survey, if possible, quite down to its exit into the sea, to make observations for fixing the latitudes and longitudes, and to bring home maps and drawings both of it and the countries through which he should pass. Accordingly, Mr. Hearne set out from Prince of Wales' Fort, or Churchill River, lat. 58. 47. N. and lon. 94. 7. W. on the 7th of December 1770. On the 13th of June he reached the Coppermine River, and found it all the way, even to its exit into the sea, encumbered with shoals and falls, and entering it over a dry flat of the shore, the tide being then out, which seemed, by the edges of the ice, to rise about 12 or 14 feet. This rise, on account of the falls, could carry the tide but a little way within the river's mouth, so that the water in it had not the least brackish taste. Mr. Hearne was, nevertheless, sure of the place it emptied itself into, being the sea, or a branch of it, by the quantity of whale and seal skins which the Eskimaux had at their tents; and also by the number of seals which he saw upon the ice. The sea, at the river's mouth, was full of islands and shoals, as far as he could see by the assistance of a pocket telescope; and the ice was not yet (July 17th) broken up, but thawed away only for about three quarters of a mile from the shore, and for a little way round the islands and shoals which lay off the river's mouth. But he had the most extensive view of the sea when he was about eight miles up the river; from which station, the extreme parts of it bore N. W. by W. and N. E. It appears from the map which Mr. Hearne constructed of this singular journey, that the mouth of the Coppermine River lies in lat. 72° N. and lon. 25° W. from Churchill River; that is about 119° W. of Greenwich. Mr. Hearne's journey back from the Coppermine River to Churchill River, lasted till June 30, 1772; so that he was absent almost a year and seven months. The country lying round Hudson's Bay is called New Britain, including Labrador, now New N. and S. Wales. The entrance of the bay, from the ocean, after leaving to the N. Cape Farewell and Davis' Straits, is between Resolution Isles on the N. and Button's Isles on the Labrador coast to the S. forming the eastern extremity of the strait, distinguished by the name of its great discoverer. The vast countries that surround Hudson's Bay, abound with animals whose skins and furs are far superior in quality to those found in less northerly regions,

In 1670 a charter was granted to a company, which does not consist of above ten persons, for the exclusive trade to this bay; and they have acted under it, ever since, with great benefit to themselves. They employ four ships and 130 seamen, and have several forts; namely, Prince of Wales' Fort, Churchill River; Nelson, New Severn, and Albany, which are all seated on the west side of the bay. The French, commanded by the late unfortunate navigator, M. de la Peyrouse, destroyed these forts, and the settlements, &c. valued at 500,000*l.* But the damage has been since repaired, and the commerce in a flourishing situation. See *New Britain*, *ESKIMAUX*, and *LABRADOR*.

HUDSON'S Bay Company. See *COMPANY*.

HUDSON'S-River, one of the finest rivers in North America, rising in the mountainous country between the Lakes Ontario and Champlain. It waters Albany and Hudson, and proceeds in a southerly direction to New York, where it enters the Atlantic Ocean, at York Bay, after a course of 250 miles. The tide flows a few miles above Albany, which is 160 miles from New York. It is navigable for sloops to Albany, and for ships to Hudson.

HUDSONIA, in botany; a genus of the monogynia order, belonging to the dodecandria class of plants. There is no corolla; the calyx is pentaphyllous and tubular: there are 15 stamina; the capsule is unilocular, trivalvular, and trispermous.

HUE and CRY, in law, the pursuit of a person who has committed felony on the high-way. Of this custom, which is of British origin, the following deduction is given by Mr. Whitaker. "When it was requisite for the Britons to call out their warriors into the field, they used a method that was particularly marked by its expeditiousness and decisiveness, and remains partially among us to this moment. They raised a cry, which was immediately caught up by others, and in an instant transmitted from mouth to mouth through all the region. And, as the notice passed along, the warriors snatched their arms, and hurried away to the rendezvous. We have a remarkable description of the fact in Cæsar, and there see the alarm propagated in 16 or 17 hours through 160 miles in a line. And the same practice has been retained by the Highlanders to our own time. When the lord of a clan received intelligence of an enemy's approach, he immediately killed a goat with his own sword, dipped the end of a half-burnt stick in the blood, and then gave it and the notice of the rendezvous to be carried to the next hamlet. The former symbolically threatened fire and sword to all his followers that did not instantly repair to the latter. The notice was dispatched from hamlet to hamlet with the utmost expedition. And in three or four hours the whole clan was in arms, and assembled at the place appointed. This was within these few years the ordinary mode by which the chieftains assembled their followers for war. The first person that received the notice, set out with it at full speed, delivered it to the next that he met, who instantly set out on the same speed, and handed it to a third. And, in the late rebellion of 1745, it was sent by an unknown hand through the region of Breadalbane; and, flying as expeditiously as the Gallic signal in Cæsar, traversed a tract of 32 miles in three hours. This quick method of giving a diffusive alarm is even preserved among ourselves to the present day; but is applied, as it seems from Cæsar's account above to have been equally applied among the Celtæ, to the better purposes of civil polity. The *butesium* and *clamour* of our ancient laws, and the *hue and cry* of our own times, is a well-known and powerful process for spreading the notice and continuing the pursuit of any fugitive felons. The cry, like the clamour of the Gauls or the summons of the Highlanders, is taken from town to town and from county to county; and a chain of communication is speedily carried from one end of the kingdom to the other."

HUER, a name given to certain fountains in ICELAND, of a most extraordinary nature; forming at times *jets d'eau* of scalding water ninety-four feet high and thirty in diameter, creating the most magnificent gerbes that can be imagined, especially when backed by the setting sun. They arise out of cylindrical tubes of unknown depths: near the surface they expand into apertures of a funnel shape, and the mouths spread into a large extent of stalaetitical matter, formed of successive scaly concentric undulations. The playing of these stupendous spouts is foretold by noises roaring like the cataract of Niagara. The cylinder begins to fill: it rises gradually to the surface, and as gradually increases its height, smoking amazingly, and flinging up great stones. After attaining its greatest height it gradually sinks till it totally disappears. Boiling *jets d'eau* and boiling springs are frequent in most parts of the island; and in many parts they are applied to the culinary uses of the natives, see plate 4. The most capital is that which is called *Geyser* or *Geyser*, in a plain rising into small hills, and in the midst of an amphitheatre, bounded by the most magnificent and various-shaped icy mountains; among which the three-headed Heckla soars pre-eminent. These huers are not confined to the land; they rise in the very sea, and form scalding fountains amidst the waves. Their distance from the land is unknown; but the new volcanic isle, twelve miles off the point of Reickenes, emitting fire and smoke, proves that the subterraneous fires and waters extend to that space; for those awful effects arise from the united fury of these two elements.

In the "Habitable World described," we find the following account. "Hot springs are found in many parts of Iceland; from some, the water flows gently as from other springs, and it is then called *laug*, that is, a bath; from others it spouts boiling water with a great noise, and is then called *buer* or *kittel*, (kettle). I have visited, says Horrebow, many of these warm baths, but never found the least appearance of sulphur near them, (though Von Troil says he tasted sulphur in them), nor do the waters taste of any mineral. Though the degree of heat in these springs is unequal, I do not remember, says Von Troil, ever to have observed it under 188 of Fahrenheit's thermometer; in some places we found it 193, at another, where the most remarkable boiling fountain is, 213 degrees. If you fill a bottle at one of these spouting springs, says Horrebow, the water contained in the bottle will boil up two or three times, at the same time with the water in the well; and if the bottles are corked up as soon as filled, they will burst. This water when cold is pleasant to drink, and cows that drink of it yield a greater proportion of milk. The inhabitants use these waters for various purposes; some use it for dyeing, others boil their meat in it, by putting the meat in a vessel of cold water, and setting it in the hot spring; others bend hoops of great thickness with it, and others bathe in it and wash with it.

"Among the many hot springs in Iceland, is one worth the attention of the curious, and we have given a plate, the better to describe it. It is about two days journey from Heckla, and makes its appearance in a large field, where, on one side, the eye is awfully surprised with high mountains seen at a great distance covered with ice, whose summits are lost in the clouds, so that their sharp unequal points become invisible. Sometimes, by particular winds, the clouds shall sink and enwrap the mountains, leaving their summits only to view, appearing as it were to rest upon the clouds. On the other side, the sight is dreadful, awakened by the volcano Heckla, with its three points covered with ice, rising above the clouds, and with the smoke ascending from it, forming other clouds at some distance from the real ones: in one place is a ridge of high rocks, at the foot of which boiling water gushes forth, and further on, a marsh extends about half a mile in circumference, where are forty or fifty boiling springs, from which a vapour ascends

to a prodigious height, and from some, water four or five feet in height.

"In the midst of these spouts, an enormous fountain of boiling water rises by starts, at certain intervals, from 20 to 60 feet in height, attended with a stupendous roar. The depth of the opening from whence this water issued could not be ascertained, for sometimes the water sunk down several fathoms, and some seconds passed before a stone, that was thrown in, reached its surface. The opening itself is perfectly round, nineteen feet in diameter, and forming above, on the surface of the ground, a basin 59 feet in diameter, whose edge is 9 feet above the orifice or hole.

"The strength of the vapour that throws up this water is excessive; it not only prevents the stones thrown in from sinking, but even casts them up with the water to a very great height."

HUENS, an island of the Baltic, six miles from the coast of Zealand, and three from that of Sweden. It is subject to the Swedes, to whom it was ceded by the Danes in 1658. It has one scattered village, and produces hay and every species of corn, more than sufficient for its own consumption. In this island was the observatory of the celebrated Tycho Brahe. Huens is six miles in circumference, nine miles S. by E. of Elsinore, and 14 N. by E. of Copenhagen. E. lon. 12. 38. N. lat. 55. 54.

HUESCA, an ancient and considerable town of Spain, in Arragon, with a bishop's see, and a university. It is seated on the Illucla, 35 miles N. E. of Saragossa. W. lon. 0. 2. N. lat. 42. 18.

HUESCAR, a town of Spain, in Granada, with a castle, 60 miles N. E. of Granada. W. lon. 2. 20. N. lat. 37. 45.

HUET (PETER DANIEL), a very learned French writer, born at Caen in Normandy, February 8, 1630. He discovered from his infancy a great inclination to the study of polite literature and the sciences, and at first applied himself to the law; but Des Cartes's principles, and Bochart's sacred geography, made him change his studies for those of philosophy, mathematics, the languages, and antiquities. His admiration for Bochart made him desirous of knowing him. He contracted a very strict friendship with him, and accompanied that learned man to Sweden. Here Christina would have engaged him in her service; but he, sensible of her inconstant temper, returned to France. All he brought with him was a copy of a MS. of Origen, which he transcribed at Stockholm. He refused several offers from Christina after she abdicated and went to Rome, and from Gustavus her successor. In 1670, Mr. Bossuet being appointed by the king preceptor to the dauphin, his majesty chose Mr. Huet for his colleague, with the title of *sub-preceptor to the prince*. It was he that formed the plan of the commentaries in *usum Delphini*, and directed the execution. His sentiments of piety determined him to enter into holy orders, which he did at the age of 46. Soon after this, he was presented by the king to the abbey of Annay; and in 1685 was nominated to the bishopric of Soissons, which he exchanged for the see of Avranches. After governing that diocese ten years, he resigned, and was made abbot of Fontenay near Caen. His love for his native place determined him to fix there. But law-suits coming upon him, he retired to Paris, and lodged among the Jesuits in the *Maison Professe*, whom he had made heirs to his library. A severe distemper weakened his body extremely, but not the vigour of his genius: he wrote his own life in a very elegant style; and died in 1721, aged 91. He was a man of very agreeable conversation; and of great probity, as well as immense erudition. The following are the titles of his principal works. 1. *De claris interpretibus, et de optimo genere interpretandi*. 2. An edition of Origen's Commentaries on the holy Scriptures, in Greek and Latin. 3. A Treatise on the Origin of the Romans. 4. *Demonstratio Evangelica*, folio. 5. *Quaestiones Ahetane de concordia rationis et fidei*. 6. Of

the situation of the terrestrial paradise, in French. 7. A History of the commerce and navigation of the Ancients, which has been translated into English. 8. *Commentarius de rebus ad eum pertinentibus*. 9. *Huetiana*. 10. Latin and Greek verses, &c.

HUGHES (JOHN), an ingenious and polite writer, was born in 1677. In the earliest parts of his youth, he cultivated the filter-arts, poetry, drawing and music, in each of which he by turns made a considerable progress; but followed those and his other studies only as agreeable amusements, under frequent confinement on account of his ill state of health. The lord chancellor Cowper made him secretary for the commissions of the peace without his knowledge, and distinguished him with singular marks of his esteem. He continued in the same employment under the earl of Macclesfield, and held it to the day of his death; which happened in 1719, the very night in which his tragedy, intitled *The Siege of Damascus*, was first acted. He was then 42. He translated Fontenelle's Dialogues of the Dead, Vertot's Revolutions of Portugal, and the Letters of Abelard and Eloisa. He gave a very accurate edition of Spenser's works, with his life, a glossary, and remarks; and wrote several papers in the Tatler, Spectator, and Guardian. Mr. Duncombe, who married his sister, collected his poems and essays in 2 vols. 12mo, in 1735.

HUGHLY, a town of Asia, in the kingdom of Bengal, seated on the most westerly branch of the river Ganges. It is of large extent, reaching about two miles along the river side, and drives a great trade in all the commodities of that country; affording rich cargoes for 50 or 60 ships annually, besides what is brought on carriages to the neighbouring towns. Saltpetre is brought hither from Patnia in vessels above 50 yards long and five broad. The inhabitants are chiefly Indians; but there are also Portuguese, English, and other Europeans. E. long. 87. 55. N. lat. 22. 0.

HUGO CAPET, chief of the third race of the kings of France. Being count of Paris and Orleans, he was raised to the throne for his military valour and public virtues in 987.

HUGONIA, in botany; a genus of the decandria order, belonging to the monadelphia class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is pentapetalous; the fruit is a plum with a striated kernel.

HUGUENOTS, an appellation given by way of contempt to the Reformed or Protestant Calvinists of France. The name had its first rise in 1560; but authors are not agreed as to the origin and occasion thereof: but one of the two following seems to be the least forced derivation.

One of the gates of the city of Tours is called the gate Fourgon, by corruption from *feu Hugon*, i. e. the late Hugon. This Hugon was once count of Tours, according to Eginhardus, in his Life of Charles the Great, and to some other historians. He was it seems a very wicked man, who by his fierce and cruel temper made himself dreadful; so that after his death he was supposed to walk about in the night-time, beating all those he met with: this tradition the judicious Thuanus has not scrupled to mention in his History. Davila and other historians pretend, that the nickname of *Huguenots* was first given to the French Protestants, because they used to meet in the night-time in subterraneous vaults near this gate of Hugon; and what seems to countenance this opinion is, that they were first called by the name of *Huguenots* at this city of Tours. Others assign a more illustrious origin to that name; and say that the Leaguers gave it to the Reformed, because they were for keeping the crown upon the head of the royal line descended from Hugh Capet; whereas they were for giving it to the house of Guise, as descended from Charles the Great. Others again derive it from a French and faulty pronunciation of the German word

éligués, signifying confederates, and originally applied to that valiant part of the city of Geneva, which entered into an alliance with the Swiss cantons, in order to maintain their liberties against the tyrannical attempts of Charles III. duke of Savoy. These confederates were called *Eiguots*, whence Huguenots.

The persecution which they underwent has scarce its parallel in the history of religion: though they obtained a peace from Henry III. in 1576, it was only of short continuance; and their sufferings, mitigated by the famous edict of Nantes, granted to them in 1598 by Henry IV. were again renewed, after the revocation of this edict, by Louis XIV. in 1685.

HULHEN, a town of the Austrian Netherlands, nine miles S. E. of Brussels. E. lon. 4. 37. N. lat. 51. 44.

HULK, an old ship of war, fitted with an apparatus to fix or take out the masts of his majesty's ships as occasion requires. The mast of this vessel is extremely high, and withal properly strengthened by *shrouds and stays*, in order to secure what are called the *sheers*, which serve, as the arm of a crane, to hoist out or in the masts of any ship lying alongside. The sheers are composed of several long masts, whose heels rest upon the side of the hulk, and having their heads declining outward from the perpendicular, so as to hang over the vessel whose masts are to be fixed or displaced. The tackles, which extend from the head of the mast to the sheer-heads, are intended to pull in the latter towards the mast head, particularly when they are charged with the weight of a mast after it is raised out of any ship, which is performed by strong tackles depending from the sheer-heads. The effort of these tackles is produced by two capsterns, fixed on the deck for this purpose.

HULK is also a name bestowed on any old vessel laid by as unfit for further service. It is probably derived from the *κλυζες*, or vessels of burthen, of the ancient Grecians.

HULL, or KINGSTON-UPON-HULL, a town in the E. riding of Yorkshire, with a market on Tuesday and Saturday. It is seated on a river called the Hull, on the N. side of the river Humber, and is a handsome large town, with two parish churches. It is fortified, and is the first town that shut its gates against Charles I.; but its fortifications are now inconsiderable, while its commerce has increased so much, that it is probably the fourth port in the kingdom. Its situation is extremely advantageous; for, beside its communication with the Yorkshire rivers and canals, it has access also, by the Humber, to the Trent and all its branches and communications. Hence it has the import and export trade of many of the northern and midland counties. The foreign trade is chiefly to the Baltic; but it has also regular traffic with the southern parts of Europe, and with America. More ships are sent hence to Greenland than from any other port, that of London excepted. The coasting trade for coal, corn, wool, manufactured goods, &c. is very extensive. The harbour is artificial, consisting of a dock, said to be the largest in the kingdom, with which the river communicates. Among the public buildings, are the Trinity House, for the relief of seamen and their widows; an exchange, and a town-hall. The noble stone bridge, over the river, to Holderness, was rebuilt in 1787, and consists of 14 arches. Hull sends two members to parliament, and is 41 miles N. of Lincoln, 36 S. E. of York, and 173 N. of London. W. lon. 0. 14. N. lat. 53. 45.

HULL, in the sea-language, is the main body of a ship, without either masts, yards, sails, or rigging. Thus *to strike a bull* in a storm, is to take in her sails, and to lash the helm on the lee-side of the ship; and *to hull*, or *lie a bull*, is said of a ship whose sails are thus taken in, and helm lashed a-lee.

HULST, a strong town of Dutch Flanders, capital of a bailiwick of the same name. It was taken by the French in 1747. It has a very fine town-house, and the palace of the com-

mander is the handsomest in all Flanders. It is seated on a plain, which may be overflowed, 15 miles N. W. of Antwerp, and 17 N. E. of Ghent. E. lon. 4. 6. N. lat. 51. 18.

HUMANITIES, signify grammar, rhetoric, and poetry, known by the name of *literæ humaniores*; for teaching of which, there are professors in the universities of Scotland, called *humanists*.

HUMBER, a river formed by the Trent, Ouse, Derwent, and several other streams. By the late inland navigation, it has a communication with the rivers Mersey, Dec, Ribble, Severn, Thames, Avon, &c.; which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester. It divides Yorkshire from Lincolnshire, and falls into the German ocean near Holderness.

HUME (DAVID, Esq.) a late celebrated philosopher and historian, was born in the south part of Scotland, on the 26th of April O. S. in the year 1711. Being the younger son of a country gentleman of good family, but no great fortune, his patrimony was of consequence insufficient to support him. For this reason he was destined for the bar, and passed through his academical courses in the university of Edinburgh; but being more inclined to studies of a different nature, he never put on the gown, nor even took the introductory steps necessary for that purpose. The writings of Locke and Berkeley had directed the attention of the generality of learned men towards metaphysics; and Mr. Hume having early applied himself to studies of this kind, published in 1739 the two first volumes of his *Treatise of human nature*, and the third the following year. He had the mortification, however, to find his book generally decried, and to perceive that the taste for systematic writing was now on the decline. He therefore divided this treatise into separate Essays and Dissertations, which he afterwards published at different times with alterations and improvements.

In 1742 Mr. Hume published two small volumes, consisting of Essays moral, political, and literary. These were better received than his former publication; but contributed little to his reputation as an author, and still less to his profit; and his small patrimony being now almost spent, he accepted an invitation from the marquis of Annandale to come and live with him in England. With this nobleman he staid a twelvemonth; during which time his small fortune was considerably increased. He then received an invitation from General St. Clair, to attend him as a secretary to his expedition, which was at first meant against Canada, but afterwards ended in an excursion against the coast of France. In 1747 he received an invitation from the general to attend him in the same station in his military embassy to the courts of Vienna and Turin. He then wore the uniform of an officer; and was introduced at these courts as aid-de camp to the general, along with Sir Harry Erskine and Captain Grant, afterwards General Grant. In 1749 he returned to Scotland, and lived two years with his brother at his country-house; where he composed the second part of his Essays, called *Political Discourses*. And now the general approbation of his performances was indicated by a more extensive sale than formerly, and likewise by the numerous answers published by different persons in order to counteract their supposed pernicious tendency. In 1752 were published, at Edinburgh, his *Political Discourses*, the only work of his which was well received on its first appearance; and the same year, at London, his Inquiry concerning the Principles of Morals, which in his own opinion was incomparably the best of all his performances. This year also he was appointed librarian to the Faculty of Advocates at Edinburgh; the principal advantage resulting from which employment was, that he had by that means the command of a large library. He then formed

the plan of writing the History of England: but deeming the whole to be too extensive, he confined his history to that of Britain under the house of Stuart. The book was almost universally decried on its first appearance, and soon after seemed to sink in oblivion. Dr. Herring primate of England, and Dr. Stone primate of Ireland, were the only literati of the author's acquaintance who approved of the work, and sent him messages not to be discouraged.

Notwithstanding the approbation of these eminent men, however, Mr. Hume's spirits were so much sunk by his bad success, that he had some thoughts of retiring to France, changing his name, and bidding adieu to his own country for ever; but his design was rendered impracticable by the breaking out of the war of 1755 between France and Britain. He then published his Natural History of Religion; to which an answer was published, soon after its appearance, in the name of Dr. Hurd bishop of Lichfield and Coventry; of which, however, he hath since disclaimed being the sole author. In 1756 the second volume of the History of the Stuarts was published, two years after the appearance of the first. This was better received, and helped to retrieve the character of the former volume. Three years after, his History of the House of Tudor made its appearance; which was almost as ill received as the History of the Stuarts had been, the reign of Elizabeth being particularly obnoxious. The author, however, had now learned to despise popular clamours; and continued to finish at his leisure the more early part of the English history, which was published in 1761, and was received with tolerable success.

Mr. Hume being now turned of fifty, and having obtained by the sale of his books a competent and independent fortune, retired into his native country of Scotland, determined never more to set his foot out of it. From this resolution, however, he was diverted by the earl of Hertford; whom he attended as secretary on his embassy to Paris in 1763. In 1765, the earl being appointed lord lieutenant of Ireland, Mr. Hume was intrusted with the sole management of the business of the state till the arrival of the duke of Richmond towards the latter end of the year. In 1767 he returned to Edinburgh, with a much larger income, procured to him by the earl of Hertford, than he formerly had; and now formed the same design he had formerly entertained, namely, of burying himself in his philosophical retreat. In this, however, he was again disappointed, by receiving an invitation from General Conway to be under-secretary; and this invitation he was prevented from declining, both by the character of the person, and his connections with lord Hertford. In 1769 he returned to Edinburgh, possessed of 1000*l.* a-year, healthy, and though somewhat stricken in years, yet having a prospect of long enjoying his ease, and of seeing the increase of his reputation. Of his last illness and character, he himself gives the following account: "In spring 1775 I was struck with a disorder in my bowels; which at first gave me no alarm, but has since, as I apprehend it, become mortal and incurable. I now reckon upon a speedy dissolution. I have suffered very little pain from my disorder; and what is more strange, have, notwithstanding the great decline of my person, never suffered a moment's abatement of my spirits; insomuch that, were I to name the period of my life which I should most choose to pass over again, I might be tempted to point to this latter period. I possess the same ardour as ever in study, and the same gaiety in company. I consider, besides, that a man of sixty-five, by dying, cuts off only a few years of infirmities; and though I see many symptoms of my literary reputation breaking out at last with additional lustre, I know that I could have but few years to enjoy it. It is difficult to be more detached from life than I am at present.

"To conclude, historically, with my own character, I am, or rather was (for that is the style I must now use in speaking

of myself; which emboldens me the more to speak my sentiments); I was, I say, a man of mild dispositions, of command of temper, of an open, social, and cheerful humour, capable of attachment, but little susceptible of enmity, and of great moderation in all my passions. Even my love of literary fame, my ruling passion, never soured my temper, notwithstanding my frequent disappointments. My company was not unacceptable to the young and careless, as well as to the studious and literary; and as I took a particular pleasure in the company of modest women, I had no reason to be displeased with the reception I met with from them. In a word, though most men any wise eminent have found reason to complain of calumny, I never was touched, or even attacked, by her baleful tooth: and though I wantonly exposed myself to the rage of both civil and religious factions, they seemed to be disarmed, in my behalf, of their wonted fury. My friends never had occasion to vindicate any one circumstance of my character and conduct: not but that the zealots, we may well suppose, would have been glad to invent and propagate any story to my disadvantage, but they could never find any which they thought would wear the face of probability. I cannot say there is no vanity in making this funeral oration of myself, but I hope it is not a misplaced one; and this is a matter of fact which is easily cleared and ascertained."

His fears concerning the incurableness of his disorder proved too true. He died on the 25th of August 1776; and was interred in the Calton burying-ground, Edinburgh, where a monument is erected to his memory.

HUMECTATION, formed of humour, moisture, moistening, in pharmacy, the preparing of a medicine, by steeping it a while in water, in order to soften and moisten it when too dry; or to cleanse it, or prevent its subtiler parts from being dissipated in grinding, or the like.

HUMECTATION is also used for the application of moistening remedies.

In this sense we say, embrocations, emplasters, unctions, humectations, fomentations, &c.

HUMERUS, or *Os HUMERI*, in anatomy, the uppermost bone of the arm, popularly called the *shoulder-bone*; extending from the scapula, or shoulder-blade, to the upper end of the cubitus, or elbow. See **ANATOMY**, p. 167.

HUMIDITY, that quality in bodies whereby they are capable of wetting other bodies. This differs very much from fluidity; and seems to be merely a relative thing, depending on the congruity of the component particles of the liquor to the pores of such particular bodies as it is capable of adhering to, penetrating a little into, or wetting. Thus, for instance, quicksilver is not a moist thing with regard to our hands or clothes; but may be called so in reference to gold, tin, or lead, to whose surfaces it will perfectly adhere, and render them soft and moist.

HUMILIATI, a congregation of religious in the church of Rome, established by some Milanese gentlemen on their release from prison, where they had been confined under the emperor Conrad, or, as others say, under Frederick I. in the year 1162. This order, which acquired great wealth, and had no less than 90 monasteries, was abolished by pope Pius V. in 1570, and their houses given to the Dominicans and Cordeliers for their luxury and cruelty.

HUMILIATION, the act of humbling, i. e. of abating a person's pride, and bringing him lower in his own opinion.

In this sense, humiliation stands distinguished from mortification: humiliation brings down the mind; mortification subdues the flesh.

HUMILITY, in ethics, is a virtue consisting in the moderate value which a person puts upon himself, and every thing relating to him. Or, more particularly, it consists in not attribut-

ing to ourselves any excellence or good which we have not; in not over-rating any thing which we have or do; in not taking an immoderate delight in one's self; in not assuming more of the praise of a quality or action than belongs to us; and in a lowly sense and acknowledgement of our imperfections, errors, and sins. This virtue expresses itself in the modesty of our appearance, of our pursuits, and of our behaviour towards other men. It is distinguished from affectation, bashfulness, and meanness.

HUMMING-BIRD. See TROCHILUS.

HUMMOCH, an island of Asia, in the Eastern Ocean, about six miles long. Here is a rajah, supported in his authority by the Dutch E. India Company. The natives have a great deal of the Malay, both in appearance and disposition, and speak the same language as at Mindanao. This island is exceedingly fertile, and produces most of the tropical fruits. But their principal articles of trade with the Dutch are bees-wax and honey. They lie five leagues S. of Mindanao. E. lon. 125. 12. N. lat. 5. 27.

HUMOUR, from the Latin, *humor*, in its original signification, stands for moisture in general; from whence it has been restrained to signify the moisture of animal bodies, or those fluids which circulate through them. It is distinguished from moisture in general, in this, that humours properly express the fluids of the body; when, in a vitiated state, it would not be improper to say, that the fluids of such a person's body were full of humours. The only fluids of the body, which, in their natural and healthful state, are called *humours*, are those in the eye: we talk of the aqueous humour, the crystalline humour, without meaning any thing that is morbid or diseased; yet, when we say in general, that such a person has got a humour in his eye, we understand it in the usual sense of a vitiated fluid.

As the temper of the mind is supposed to depend upon the state of the fluids in the body, *humour* has come to be synonymous with temper and disposition. A person's humour, however, is different from his *disposition*, in this, that humour seems to be the disease of a disposition: it would be proper to say that persons of a serious temper or disposition of mind, were subject to melancholy humours; that those of a delicate and tender disposition, were subject to peevish humours. Humour may be agreeable or disagreeable: but it is still humour; something that is whimsical, capricious, and not to be depended upon. An ill-natured man may have fits of good-humour, which seem to come upon him accidentally, without any regard to the common moral causes of happiness or misery. A fit of cheerfulness constitutes the whole of good-humour; and a man who has many such fits, is a good-humoured man: yet he may not be good-natured; which is a character that supposes something more constant, equable, and uniform, than what was requisite to constitute good-humour.

HUMOUR is often made use of to express the quality of the imagination, which bears a considerable resemblance to wit. Wit expresses something that is more designed, concerted, regular, and artificial; humour, something that is more wild, loose, extravagant, and fantastical; something which comes upon a man by fits, which he can neither command nor restrain, and which is not perfectly consistent with true politeness. Humour, it has been said, is often more diverting than wit; yet a man of wit is as much above a man of humour, as a gentleman is above a buffoon; a buffoon, however, will often divert more than a gentleman. The duke of Buckingham, however, makes humour to be all in all: wit, according to him, should never be used, but to add an agreeableness to some proper and just sentiment, which, without some such turn, might pass without its effect. See WIT.

HUMPHREY (Dr. LAWRENCE), a very learned English

divine in the 16th century, who, during the persecution under queen Mary, retired with other Protestant refugees to Zurich. He returned on the accession of queen Elizabeth; and was made president of Magdalen college, Oxford, dean of Gloucester, and then dean of Winchester. He was a great and general scholar, an able linguist, and a deep divine; and published, 1. *De religionis conservatione et reformatione, deque primatu regum.* 2. *De ratione interpretandi auctores.* 3. *Optimates; sive de nobilitate, ejusque origine.* 4. Sermons, and other works. He died in 1590.

HUMULUS, the hop; a genus of the pentandria order, belonging to the dicecia class of plants; and in the natural method ranking under the 53d order, *Scabridæ*. The male calyx is pentaphyllous; there is no corolla: the female calyx is monophyllous, patent obliquely, and entire; there is no corolla, but two styles; and one seed within the calyx, the latter consisting of one large leaf. There is only one species, viz the lupulus, which is sometimes found wild in hedges near houses and gardens, but probably is not indigenous. The stalk is weak and climbing; it creeps up the support in a spiral, ascending always from the right hand to the left. The stalk and the leaves are rough to the touch; the upper leaves are heart-shaped, the lower ones divided into three lobes serrated on the edges, and grow in pairs on long footstalks. The male flowers grow on a distinct plant on branched peduncles; the females on peduncles in pairs of the form of a *strobilus* or cone, composed of large imbricated calyces containing each one or two seeds. For the culture and uses of hops, see the articles HOP and HUSBANDRY.

HUNDRED, HUNDREDUM, or *Centuria*, a part or division of a county; which was anciently so called from its containing an hundred families, or from its furnishing an hundred able men for the king's wars. After king Alfred's dividing this kingdom into counties, and giving the government of each county to a sheriff, these counties were divided into hundreds, of which the constable was the chief officer. The grants of hundreds were at first made by the king to particular persons: but they are not now held by grant or prescription, their jurisdiction being devolved to the county-court; a few of them only excepted, that have been by privilege annexed to the crown, or granted to some great subjects, and still remain in the nature of a franchise.

HUNDRED Court. This is only a larger COURT-BARON, being held for all the inhabitants of a particular hundred instead of a manor. The free suitors are here also the judges, and the steward the register, as in the case of a court-baron. It is likewise no court of record; resembling the former in all points, except that in point of territory it is of a greater jurisdiction. This is said by Sir Edward Coke to have been derived out of the county-court for the ease of the people, that they might have justice done them at their own doors, without any charge or loss of time: but its institution was probably co-eval with that of hundreds themselves, which were formerly observed to have been introduced though not invented by ALFRED, being derived from the policy of the ancient Germans. The *centeni*, we may remember, were the principal inhabitants of a district composed of different villages, originally in number an hundred, but afterwards only called by that name; and who probably gave the same denomination to the district out of which they were chosen. Cæsar speaks positively of the judicial power exercised in their hundred-courts and courts-baron. "*Principes regionum atque pagorum*" (which we may fairly construe, the lords of hundreds and manors) "*inter suos jus dicunt, controversasque minuunt.*" And Tacitus, who had examined their constitution still more attentively, informs us not only of the authority of the lords, but that of the *centeni*, the hundredors, or jury; who were taken out of the common freeholders, and had themselves a share in the determination. "*Eligantur in*

conciliis et principibus, qui jura per pagos vicisque reddunt: centum singulis, ex quibus comites, consilium simul et auctoritas, adfert." This hundred court was denominated *hareda* in the Gothic constitution. But this court, as causes are equally liable to removal from hence as from the common court baron, and by the same writs, and may also be reviewed by writ of false judgment, is therefore fallen into equal disuse with regard to the trial of actions.

HUNGARY, a kingdom of Europe, the greatest part of which was anciently called *Pannonia*. It had the name of *Hungary* from the Huns, a Scythian or Tartar nation, who subdued it in the ninth century. It lies between the 18th and 22d degrees of east long. and betwixt the 45th and 49th degrees of north lat. being bounded to the north by the Carpathian mountains, which separate it from Poland; to the south, by Servia, and the river Drave, which separates it from Slavonia; to the west, by Moravia, Austria, and Stiria; and to the east, by Wallachia and Transylvania. It is about 240 miles in length, and 235 in breadth; and is divided into the Upper and Lower Hungary, the former being that part which lies towards the east, and the latter that which lies towards the west.

The northern parts of the kingdom are mountainous and barren, but healthy; the southern, on the contrary, are level, and exceeding fruitful, but not very healthy. The country along the Danube, from Presburg to Belgrade, for upwards of 200 miles, is one continued plain, and no soil can be more fertile: but the air, by reason of the many swamps and morasses, is not so wholesome as on the higher and drier grounds. Here are mines of gold, silver, copper, iron, lead, quick-silver, cinnabar, antimony, yellow orpiment, sulphur, vitriol, marcasite, salt native and factitious, saltpetre, magnets, asbestos or stone-flax, marble of several colours, alabaster, with diamonds, and all sorts of precious stones. Corn is in such plenty that it is sold for one sixth of its price in England. Their grapes are large and luscious; and their wines preferred to any in Europe. They have vast numbers of cattle and horses, the latter mostly mouse-coloured, with buffaloes, deer, wild fowl, game, and fish, and many species of wild beasts, particularly chamois, goats, bears and lynxes. Of vegetables, besides vines, and the common sorts, here are tobacco, sadron, buck-wheat, millet, melons, and chestnuts. Here also are excellent warm baths, and springs of various kinds and qualities. The chief mountains of Hungary are the Crapack or Carpathian, which is the general name for all those that separate this kingdom from Poland, Moravia, Silesia, and some part of Austria. The sides of most of them are covered with wood, and their tops with snow. The chief rivers are the Danube, the Drave, the Save, the Wag or Waag, the Gran, the Temes, the Raab, and Theiss, all well stocked with fish. There are several lakes among the Carpathian mountains, and some also in the lowlands.

The inhabitants are a mixture of the descendants of the ancient Huns, Slavonians, Camani, Germans, Wallachians, Greeks, Jews, Turks, and a wandering people called *Zigduns*, said to be of uncertain origin, but probably the same as those we called *gypsies*. The Hungarians are said to be of a sanguine choleric temper, and somewhat fierce, cruel, proud, and revengeful. They have been always reputed good soldiers, being much more inclined to arms, martial exercises, and hunting, than to arts, learning, trade, or agriculture. The nobility affect great pomp and magnificence, and are much addicted to feasting and carousing. The men in general are strong and well proportioned. They shave their beards, but leave whiskers on the upper lip; wearing fur caps on their heads, a close-bodied coat girt with a sash, with a short cloak or mantle over all, so contrived as to be buckled under the arm, and leave the right hand at liberty. Their horse are called *buffars*, and

their foot *heydukes*. The former wear a broad-sword, or scimitar, and carry a hatchet or battle-axe. Their horses are fleet, but not near so large as the German horses, and therefore they stand up on their short stirrups when they strike. The heydukes usually wear feathers in their caps, according to the number of the enemies they pretend to have killed. Both horse and foot are an excellent militia, very good at a pursuit, or ravaging and plundering a country, but not equal to regular troops in a pitched battle. The women, when they go abroad, wear short cloaks and a veil.

There are five languages spoken in this country, viz. the Hungarian, which, like the people, is of Scythian origin, and has little or no affinity with any European tongue; the German, Slavonian, Wallachian, and Latin. The last is spoken, not only by the better sort, but also by the common people, though very corruptly. The people called *Zigduns* have also a particular jargon.—Christianity was planted in Hungary in the ninth and tenth centuries. In the sixteenth the reformation made a great progress in it; but at present, though the Roman catholics hardly make a fourth part of the inhabitants, their religion is predominant, the Protestants enjoying only a bare toleration. Besides several sects of Protestants, here are also great numbers of the Greek church and Jews; the last pay double taxes of all kinds. Besides Jesuits colleges and other convents, there are several universities for the Roman catholics. The Lutherans also and Calvinists have their gymnasiums and schools, but under divers restrictions.

As to the traffic of this country, it is almost wholly in the hands of the Greeks and Jews. The exports consist chiefly of wine, horses, cattle, metals, minerals, saffron, wool, and leather. Hungary, in particular, furnishes Austria, and other countries west of it, with vast droves of cattle, as well as variety of excellent wines, of which those of Tokay are reckoned the best. The principal manufactures are those of copper, brass, iron, and other hard wares. Great quantities of brass and iron are exported, wrought and unwrought.

Hungary at first, like most other countries, was divided into many little principalities and states, which at length were united under one head, who had the title of *duke*. The last of these dukes was Geyfa: who, becoming a profelyte to Christianity, was baptized; after which he resigned the government to his son Stephen, who took the title of *king*, anno 1000. But as the throne was filled by election, though generally cut off the same family, the disposal of the crown was disputed between the Turkish and German emperors for near 200 years: but after the year 1527, when Ferdinand archduke of Austria was advanced to the throne, the Austrians found means to influence the elections in such a manner as to keep the crown in their family till 1687, when it was settled hereditarily on their heirs-male; and now, in consequence of an act made by the diet at Presburg in 1723, in case of the failure of heirs-male, it is to descend to females. The states of the kingdom consist of the prelates, the barons, the gentry, and the royal towns. To the first class belong two archbishops, about a dozen bishops, near as many abbots and provosts, with the Pauline and Præmonstratensian Jesuits. To the second, the stadtholder or palatine, who represents the king; the court-judge; the ban or viceroy of Dalmatia, Croatia, and Slavonia; the stadtholder of Transylvania; the great treasurer, the great cup-bearer, the steward of the household, the master of the horse, the lord chamberlain, the captain of the yeomen of the guards, and the grand-marshal of the courts who are styled the great barons, together with the inferior bans or counts and barons. To the third class belong the gentry, some of whom have noble manors, and others only the privileges of nobles. To the fourth class belong the royal free cities, which are not subject to the counts, but hold immediately of the king. The gentry also,

who hold of the archbishops and bishops, have the same privileges as the Hungarian nobility. The common people are vassals to the lords on whose lands they live, whether these lands belong to the crown, the clergy, nobility, or gentry.

The ordinary revenue of this kingdom is said to exceed a million sterling, arising from the mines, duties on cattle, royal demesnes, salt-works, contributions, customs, &c. The fortifications and garrisons constantly maintained on the frontiers against the Turks, are a great expence to the government. Hungary can easily bring into the field 100,000 men, regulars and militia; for there are 50,000 in actual pay, and the provinces furnish the other 50,000 when they are wanted.

HUNGARY Water, a distilled water prepared from the tops or flowers of rosemary; so denominated from a queen of Hungary, for whose use it was first made.

HUNGER, an uneasy sensation occasioned by long abstinence from food when the body is in a healthy state. See **ABSTINENCE**; **FASTING**; and **ANATOMY**, p. 189. The following useful observations upon hunger or famine are extracted from a paper by Dr. Percival in the second volume of the *Manchester Transactions*.

In famine, life may be protracted (the Doctor observes) with less pain and misery, by a moderate allowance of water: for the acrimony and putrefaction of the humours are obviated by such dilution, the small vessels are kept permeable, and the lungs are furnished with that moisture which is essential to the performance of their functions. Fontanus, a writer of respectable authority in the estimation of Morgagni, relates the history of a woman who obstinately refused to take any sustenance, except twice, during the space of 50 days, at the end of which period she died. But he adds, that she used water by way of drink, though in small quantity. Redi, who made many experiments (cruel and unjustifiable in my opinion) to ascertain the effects of fasting on fowls, observed, that none were able to support life beyond the ninth day to whom drink was denied; whereas one indulged with water lived more than 20 days.

Hippocrates has observed, that children are more affected by abstinence than young persons; these, more than the middle-aged; and the middle aged, more than old men. The power to endure famine, however, must depend no less upon the state of health and strength than on the age of the sufferer. There are also particular constitutions which do not suffer much pain from the calls of hunger. Dr. Percival was informed by a young physician from Geneva, that when he was a student at Montpellier, he fasted three nights and four days, with no other refreshment than a pint of water daily. His hunger was keen, but never painful, during the first and second days of his abstinence; and the two following days, he perceived only a faintness when he attempted either bodily or mental exertion: a sense of coldness was diffused over his whole frame, but more particularly affected the extremities. His mind was in a very unusual state of pusillanimity; and he experienced a great tendency to tears whenever he recollected the circumstance which had been the occasion of his fasting. During the whole period, the alvine excretions were suppressed, but not those by the kidneys: and at the close of it, his skin became tinged with a shade of yellow. The first food he took was veal broth; which had something of an intoxicating effect, producing a glow of warmth, and raising his spirits, so as to render him ashamed of his despondency. Perhaps in the case of Sextius Baculus, as recorded in the *Commentaries* of Cæsar, (lib. 6.) the extraordinary courage and prowess which he suddenly exerted, might be aided by the exhilarating effect of sustenance, which, under such circumstances, it is probable he would no longer decline. The fact, however, evinces, that neither his sickness nor the sensations of hunger had been so violent as much to impair his strength of body or vigour of mind. Pomponius

Atticus, the celebrated friend of Cicero, who put a voluntary end to his life in the 77th year of his age by refusing all food, appears to have experienced ease from his disorder, rather than any acute sufferings by famine. "Sic cum biduo cibo se abstinuisset, subito febris decessit, leviorque morbus esse cepit: tamen propositum nihilo secius peregit. Itaque die quinto, postquam id consilium inierat, decessit." *Corn. Nepos in Vit. Pomp. Attic.* From the former circumstance it has been conjectured, that he did not wholly deny himself the use of water, or of some other diluent. But though a few examples of this kind may be adduced, we have the evidence of numerous melancholy facts to show, that the pressure of want is agonizing to the human frame. "I have talked (says Dr. Goldsmith) with the captain of a ship, who was one of six that endured it in its extremity, and who was the only person that had not lost his senses when they received accidental relief. He assured me his pains at first were so great that he was often tempted to eat a part of one of the men who died, and which the rest of his crew actually for some time lived upon: He said, that during the continuance of this paroxysm he found his pains insupportable, and was desirous at one time of anticipating that death which he thought inevitable: But his pains, he said, gradually decreased after the sixth day (for they had water in the ship, which kept them alive so long), and then he was in a state rather of languor than desire; nor did he much wish for food, except when he saw others eating; and that for a while revived his appetite, though with diminished importunity. The latter part of the time, when his health was almost destroyed, a thousand strange images rose upon his mind; and every one of his senses began to bring him wrong information. The most fragrant perfumes appeared to him to have a fetid smell; and every thing he looked at took a greenish hue, and sometimes a yellow. When he was presented with food by the ship's company that took him and his men up, four of whom died shortly after, he could not help looking upon it with loathing instead of desire; and it was not till after four days that his stomach was brought to its natural tone; when the violence of his appetite returned with a sort of canine eagerness."

To those who by their occupations are exposed to such dreadful calamities, it is of serious importance to be instructed in the means of alleviating them. The American Indians are said to use a composition of the juice of tobacco, and the shells of snails, cockles, and oysters calcined, whenever they undertake a long journey, and are likely to be destitute of provisions. It is probable the shells are not burnt into quicklime, but only so as to destroy their tenacity, and to render them fit for levigation. The mass is dried, and formed into pills, of a proper size to be held between the gum and lip, which, being gradually dissolved and swallowed, obtund the sensations both of hunger and of thirst. Tobacco, by its narcotic quality, seems well adapted to counteract the uneasy impressions which the gastric juice makes on the nerves of the stomach when it is empty; and the combination of testaceous powders with it may tend to correct the secretion that is supposed to be the chief agent in digestion, and which, if not acid, is always united with acidity. Certain at least it is, that their operation is both grateful and salutary; for we find the luxurious inhabitants of the East Indies mix them with the betel nut, to the chewing of which they are universally and immoderately addicted. Perhaps such absorbents may be usefully applied, both to divide the doses and to moderate the virulence of the tobacco. For, in the internal exhibition of this plant, much caution is required, as it produces sickness, vertigo, cold clammy sweats, and a train of other formidable symptoms, when taken in too large a quantity. During the time of war, the impressed sailors frequently bring on these maladies, that they may be admitted into the hospitals, and released from servitude. It would be an easy and safe experiment

to ascertain the efficacy, and to adjust the ingredients, of the Indian composition mentioned. And there is reason to believe, that the trial would be in some degree successful; for it is known that smoking tobacco gives relief in those habitual pains of the stomach which appear to arise from the irritation of the gastric secretions. The like effect is sometimes produced by increasing the flow of saliva, and swallowing what is thus discharged. And Dr. Percival has related the case of a gentleman, who used to masticate, many hours daily, a piece of lead; which being neither hard, friable, nor offensive to the palate, suited his purpose, as he thought, better than any other substance. He continued the custom many years, deriving great ease from it, and suffering no sensible injury from the poisonous quality of the metal. On mentioning this fact to a navy surgeon, the Doctor was told, that the sailors, when in hot climates, are wont to mitigate thirst by rolling a bullet in their mouths. A more innocent mean, the Doctor observes, might be devised; but the efficacy of this evinces, that the salivary glands are for a while capable of furnishing a substitute for drink. When a scarcity of water occurs at sea, Dr. Franklin has advised that the mariners should bathe themselves in tubs of salt-water: for, in pursuing the amusement of swimming, he observed that, however thirsty he was before immersion, he never continued so afterwards; and that, though he soaked himself several hours in the day, and several days successively in salt-water, he perceived not, in consequence of it, the least taste of saltiness in his mouth. He also further suggests, that the same good effect might perhaps be derived from dipping the sailors' apparel in the sea; and expresses a confidence that no danger of catching cold would ensue.

To prevent the calamity of famine at sea, it has been proposed by Dr. Lind, that the powder of salep should constitute part of the provisions of every ship's company. This powder and portable soup, dissolved in boiling water, form a rich thick jelly; and an ounce of each of these articles furnishes one day's subsistence to a healthy full-grown man. Indeed, from Dr. Percival's experiments it appears, that salep contains more nutritive matter, in proportion to its bulk, than any other vegetable production now used as food. It has the property also of concealing the nauseous taste of salt-water; and consequently may be of great advantage at sea, when the stock of fresh water is so far consumed that the mariners are put upon short allowance. By the same mucilaginous quality, it covers the offensiveness, and even in some measure corrects the acrimony of salted and putrescent meats. But, as a preservative against hunger, salep would be most efficacious combined with an equal weight of beef suet. By swallowing little balls of this lubricating compound at proper intervals, the coats of the stomach would be defended from irritation: and as oils and mucilages are highly nutritive, of slow digestion, and indisposed to pass off by perspiration, they are peculiarly well adapted to support life in small quantities. This composition is superior in simplicity, and perhaps equal in efficacy, to the following one, so much extolled by Avicenna the celebrated Arabian physician; to whom we are indebted for the introduction of rhubarb, cassia, tamarinds, and senna, into the materia medica. "Take sweet almonds and beef suet, of each one pound; of the oil of violets two ounces; and of the roots of marsh mallows one ounce: bray these ingredients together in a mortar, and form the mass into boluses, about the size of a common nut." Animal fat is singularly powerful in alluaging the most acute sensations of thirst, as appears from the narrative of the sufferings experienced by those who were confined in the black hole at Calcutta. A hundred and forty-six persons, exhausted by fatigue and military duty, were there thrust together into a chamber of 18 cubic feet, having only two windows, strongly barred with iron, from which, in a close sultry night, and in such a climate as that of

Bengal, little or no circulation of fresh air could be enjoyed. In a few minutes, these unhappy wretches fell into so profuse a perspiration, that an idea can hardly be formed of it; and this was succeeded by a raging thirst, which increased in proportion as the body was drained of its moisture. Water! Water! became the universal cry; and an old soldier on the outside, through pity, furnished them with a few skinfuls of it. But these scanty supplies, like sprinklings on the fire, served only to feed and increase the flame. From this experience of its effects, Mr. Holwell, their chief, determined to drink no more; and kept his mouth moist by sucking the perspiration out of his shirt sleeves, and catching the drops as they fell from his head and face. "You cannot imagine (says he) how unhappy I was if any of them escaped me." He came into the prison without his coat, the season being too hot to bear it: and one of his miserable companions, observing the expedient he had hit upon of allaying his thirst, robbed him from time to time of a considerable part of his store. This plunderer, whom he found to be a young gentleman in the service of the East India Company, afterwards acknowledged, that he owed his life to the many comfortable draughts which he derived from him. Before Mr. Holwell adopted this mode of relief, he had attempted, in an ungovernable fit of thirst, to drink his own urine: but it was so intensely bitter, that a second taste could not be endured; whereas, he assures us, no Bristol water could be more soft and pleasant than his perspiration. And this, we may presume, consisted chiefly of animal fat, melted by excessive heat, and exuding from the cellular membrane through the pores of the skin.

Persons who have been accustomed to animal food, are soon reduced when supplied only with the farinacea. Several years ago, to determine the comparative nutritive powers of different substances, an ingenious young physician, as Dr. Percival informs us, made a variety of experiments on himself, to which he unfortunately fell a sacrifice. He lived a month upon bread and water; and under this regimen of diet he every day diminished much in his weight. But, in 1784, a student of physic at Edinburgh confined himself for a longer space of time to a pint of milk and half a pound of white bread daily: And he assured our author, that he passed through the usual labours of study and exercise without feeling any decay of health or strength, and without any sensible loss of bulk. The cutaneous, urinary, and alvine excretions, were very scanty during the whole period; and the discharge of scæces occurred only once in a week. In this case the oily and coagulable parts of the milk probably furnished a larger proportion of aliment, and at the same time contributed to check the waste by perspiration and other discharges; for oleaginous substances are retained long in the body by their viscosity. Dr. Russel, in his Natural History of Aleppo, relates, that in those seasons when oil abounds, the inhabitants, by indulgence in it, are disposed to fever, and affected with infarctions of the lungs; maladies which indicate both retention and obstruction. Milk has been suspected by some of producing similar effects, though in a slighter degree; and the free use of it has been on this account forbidden to asthmatics.

Gum arabic might be a good substitute for salep in the composition already recommended; and as it will give such firmness to the mass as to require mastication, the saliva, by this means separated and carried into the stomach, would further contribute to alluage the sensations both of hunger and of thirst: See *Gum Arabic*. This gum, combined with sugar and the whites of eggs, has been lately extolled in France, under the name of *patigumo*, as a remedy for catarrhal defluxions. Dr. Percival has seen cakes made of these ingredients, and thinks they might very well be applied to the purpose of obviating hunger. They are not perishable in the hottest climates, may be carried about the person with convenience, and, though very

tough, are pleasant to the taste. In the formula by which they are made, the proportion of sugar is too large, and that of gum arabic too small, if the mass be intended to alluage the cravings of appetite. According to our author's information, the receipt is as follows: "Take of fine sugar four ounces, and of gum arabic one ounce: levigate them well together; and add half an ounce of rose water, and of the white of eggs a sufficient quantity."

In our attempts to recover those who have suffered under the calamities of famine, great circumspection is required. Warmth, cordials, and food, are the means to be employed; and it is evident that these may prove too powerful in their operation, if not administered with caution and judgment. For the body, by long fasting, is reduced to a state of more than infantile debility; the minuter vessels of the brain, and of the other organs, collapse for want of fluids to distend them; the stomach and intestines shrink in their capacity; and the heart languidly vibrates, having scarcely sufficient energy to propel the scanty current of blood. Under such circumstances, a proper application of heat seems an essential measure, and may be effected by placing on each side a healthy man in contact with the patient. Pediluvia or fomentations may also be used with advantage. The temperature of these should be lower than that of the human body, and gradually increased according to the effects of their stimulus. New milk, weak broth, or water gruel, ought to be employed both for the one and the other; as nutriment may be conveyed into the system this way, by passages probably the most pervious in a state of fasting, if not too long protracted. "A lad at New-market, a few years ago, having been almost starved in order that he might be reduced to a proper weight for riding a match, was weighed at nine o'clock in the morning, and again at ten; and he was found to have gained near thirty ounces in weight in the course of an hour, though he had only drank half a glass of wine in the interval. The wine probably stimulated the action of the nervous system, and incited nature, exhausted by abstinence, to open the absorbent pores of the whole body, in order to suck in some nourishment from the air." But no such absorption as this can be expected in a state of extreme weakness and emaciation gradually induced; because the lymphatics must partake of the general want of tone and energy. And notwithstanding the salutary effects of wine in the case of the jockey, who, it is likely, had been reduced by sweating as well as by abstinence, such a stimulant might prove dangerous, and even fatal, in other cases. It appears safer therefore to advise the exhibition of cordials in very small doses, and at first considerably diluted. Slender wine-hey will perhaps best answer this purpose; and afford, at the same time, an easy and pleasant nourishment. When the stomach has been a little strengthened, an egg may be mixed with the whey, or administered under some other agreeable form. The yolk of one was, to Cornaro, sufficient for a meal; and the narrative of this noble Venetian, in whom a fever was excited by the addition of only two ounces of food to his daily allowance, shows, that the return to a full diet should be conducted with great caution, and by very slow gradations.

HUNGERFORD, a town of Berkshire in England, seated on the river Kennet, in a low and watery soil. It is a great thoroughfare in the Bath and Bristol road, 65 miles from London; and was formerly called *Inglford Charnamstreet*. The constable of this town, who is chosen annually, is lord of the manor, which he holds immediately of the crown. They have a horn here which holds about a quart, and appears by an inscription on it to have been given by John of Gaunt, together with a grant of the royal fishery in a part of the river which abounds with good trouts and cray-fish. Here is a market on Wednesdays, and a fair in August.

HUNNINGUEN, a town of France, in the department of

the Upper Rhine and late province of Alsace. It was fortified by Vauban, and is seated on the Rhine, five miles N. of Basle. E. lon. 11. 40. N. lat. 47. 40.

HUNNS, a fierce and savage nation, who formerly inhabited that part of Sarmatia bordering on the Palus Mæotis and the Tanais, the ancient boundary between Europe and Asia. Their country, as described by Procopius, lay north of mount Caucasus, which, extending from the Euxine to the Caspian Seas, parts Asiatic Sarmatia from Colchis, Iberia, and Albania; lying on the isthmus between the two seas above mentioned. Here they resided, unknown to other nations, and themselves ignorant of other countries, till the year 376. At this time, an hind pursued by the hunters, or, according to some authors, an ox stung by a gad fly, having passed the marsh, was followed by some Hunns to the other side, where they discovered a country much more agreeable than their own. On their return, having acquainted their countrymen with what they had seen, the whole nation passed the marsh, and, falling upon the Alans, who dwelt on the banks of the Tanais, almost exterminated them. They next fell upon the Ostrogoths, whom they drove out of their country, and forced to retire to the plains between the Borysthenes and the Tanais, now known by the name of *Podolia*. Then attacking the Visigoths, they obliged them to shelter themselves in the most mountainous parts of their country; till at last the Gothic nations, finding it impossible to withstand such an inundation of barbarians, obtained leave from the emperor Valens to settle in Thrace.

The Hunns thus became masters of all the country between the Tanais and Danube in 376, where they continued quietly till the year 388, when great numbers of them were taken into the pay of Theodosius I.; but, in the mean time, a party of them, called the *Nephtalite* or *White Hunns*, who had continued in Asia, over-ran all Mesopotamia, and even laid siege to Edessa, where they were repulsed with great slaughter by the Romans. The European Hunns frequently passed the Danube, committing the greatest ravages in the western empire; sometimes they fell upon the eastern provinces, where they put all to fire and sword. They were often defeated and repulsed by the Romans, but the empire was now too weak to subdue or confine them from making excursions; so that they continued to make daily encroachments, and became every day more formidable than before. In 441, the Hunns, under Attila, threatened the western empire with total destruction. This monarch, having made himself master of all the northern countries from the confines of Persia to the banks of the Rhine, invaded Mæsia, Thrace, and Illyricum; where he made such progress, that the emperor, not thinking himself safe in Constantinople, withdrew into Asia. Attila then broke into Gaul; where he took and destroyed several cities, massacring the inhabitants with the greatest cruelty. At last he was driven out with great slaughter by Aetius the Roman general and Theodoric king of the Goths, and could never afterwards make any great progress. About the year 452 or 453 Attila died, and his kingdom was immediately split into a number of small ones by his numerous children, who waged perpetual war with each other. The Hunns then ceased to be formidable, and became daily less able to cope with the other barbarous nations whom Attila had kept in subjection. Still, however, their dominion was considerable; and in the time of Charles the Great they were masters of Transylvania, Wallachia, Servia, Carniola, Carinthia, and the greater part of Austria, together with Bosnia, Sclavonia, and that part of Hungary which lies beyond the Danube. In the year 776, while Charles was in Saxony, two princes of the Hunus, Caganus and Jugunus, sent ambassadors to him, desiring his friendship and alliance. Charles received them with extraordinary marks of friendship, and readily complied with their request. However, they entered, not long after, into an

alliance with Tassila duke of Bavaria, who had revolted from Charles, and raised great disturbances in Germany. Charles dissimbled his resentment till he had entirely reduced Bavaria, when he resolved to revenge himself on the Hunns for those succours they had underhand given to his enemy. Accordingly, he ordered levies to be made throughout his dominions; and having by that means assembled a very numerous army, he divided it into two bodies, one of which he commanded himself, and the other he committed to the care of his generals. The two armies entered the country of the Hunns at different places, ravaged it far and near, burnt their villages, and took all their strong holds. This he continued for eight years, till the people were almost totally extirpated; nor did the Hunns ever afterwards recover themselves, or appear as a distinct nation.

There were two different nations that went by the name of *Hunns*; the Nephthalite or White Hunns, and the Sarmatian or Scythian Hunns. The former inhabited a rich country, bordering to the north on Persia, and at a great distance from the Sarmatian or Scythian Hunns, with whom they had no intercourse, nor the least resemblance either in their persons or manners. They were a powerful nation, and often served against the Romans in the Persian armies; but in the reign of the emperor Zeno, being provoked by Perozes king of Persia laying claim to part of their country, they defeated the Persians in two pitched battles, slew their king, over-ran all Persia, and held it in subjection for the space of two years, obliging Cahades, the son and successor of Perozes, to pay them a yearly tribute. These Hunns, called by the writers of those times the *White Hunns*, did not wander, like the others, from place to place; but, contented with their own country, which supplied them with all necessaries, they lived under a regular government, subject to one prince, and seldom made inroads, unless provoked, either into the Persian or Roman territories. They lived according to their own laws, and dealt uprightly with one another, as well as with the neighbouring people. Each of their great men used to choose 20 or more companions to enjoy with him his wealth, and partake of all his diversions; but, upon his decease, they were all buried with him in the same grave. This custom favours of barbarity; but in every other respect, the Nephthalite were a far more civilized nation than the Scythian Hunns, who, breaking into the empire, filled most of the provinces of Europe with blood and slaughter.

The latter were, according to Ammianus Marcellinus, a savage people, exceeding in cruelty the most barbarous nations. They begin to practise their cruelty, says Jornandes, upon their own children the very first day they come into the world, cutting and mangling the cheeks of their males, to prevent the growth of hair, which they must have looked upon, contrary to the sentiments of other nations, as unbecoming and unmanly. They had, perhaps, in this practice another view, which Jornandes seems to insinuate elsewhere, *viz.* to strike terror into the enemy with their countenances thus deformed and covered with scars. They had no other food but roots and raw meat, being quite unacquainted with the use of fire; and no houses at all, not even huts, but lived constantly exposed to the air, in the woods, and on the mountains, where, from their infancy, they were inured to hunger, thirst, and all manner of hardships: nay, they had such an aversion to houses, which they called the *sepulchres of the living*, that, when they went into other countries, they could hardly be prevailed upon to come within the walls of any house, not thinking themselves safe when shut up and covered. They used even to eat and sleep on horseback, scarce ever dismounting; which, in all likelihood, induced Zosimus to write, that the Hunns could not walk. They covered their nakedness with goat skins, or the skins of a sort of mice sewed together. Day and night were indifferent to them, as to buy-

ing, selling, eating, and drinking. They had no law, nor any kind of religion; but complied with their inclinations, whatever these prompted them to, without the least restraint, or distinction between good and evil. In war, they began the battle with great fury, and an hideous noise: but if they met with a vigorous opposition, their fury began to abate after the first onsets, and when once put into disorder, they never rallied, but fled in the utmost confusion. They were quite unacquainted with the art of besieging towns; and authors observe, that they never attacked the enemy's camp. They were a faithless nation, and thought themselves no longer bound by the most solemn treaties, than they found their advantage in observing them. Hence we often find them, upon the least prospect of obtaining more advantageous conditions, breaking into the Roman empire, in defiance of the most solemn oaths and engagements. Several corps of Hunns, after their coming into Europe, served in the Roman armies against the Goths and other barbarous nations; nay, they were ready, for hire, to fight against each other, being blind to every other regard and consideration.

HUNTER, a name given to a horse qualified to carry a person in the chace. The shape of the horse designed for this service, should be strong and well knit together, as the jockeys express it. Irregular or unequal shapes in these creatures are always a token of weakness. The inequalities in shape which show a horse improper for the chace, are the having a large head and a small neck, a large leg and a small foot, and the like. The head of the hunter should indeed always be large, but the neck should also be thick and strong to support it. The head should be lean, the nostrils wide, and the windpipe straight.

The hunter, in order to his behaving well in the field, ought to have great care and indulgence in the stable: he ought to have as much rest and quiet as may be, to be kept well supplied with good meat, clean litter, and fresh water by him; he should be often dressed, and suffered to sleep as much as he pleases. He should be so fed, that his dung may be rather soft than hard, and it must be of a bright and clean colour. All this may be easily managed by the continual observance and change of his food, as occasion requires. After his usual scourings he should have exercises and mashes of sweet malt, or bread and beans; or wheat and beans mixed together, may be his best food, and beans and oats his worst.

Some very great sportsmen are for keeping their horses out at grafs all the buck hunting season, never taking them up into the stable at all, but allowing them in the field as many oats with their grafs as they will eat. The horse may be thus rid three days in the week for the whole season, and never damaged by it, nor ever showing any marks of harm afterwards.

The whole shape of a horse intended for a hunter, should be this: The ears should be small, open, and pricked; or though they be somewhat long, yet if they stand up erect and bold like those of a fox, it is a sign of toughness or hardness. The forehead should be long and broad; not flat, or, as it is usually termed, *mare-faced*, but rising in the middle like that of a hare; the feather should be placed above the eye, the contrary being thought by some to threaten blindness. The eyes should be full, large, and bright; the nostrils not only large, but looking red and fresh within; for an open and fresh nostril is always esteemed a sign of a good wind. The mouth should be large, deep in the wicks, and hairy. The wind-pipe should be large, and appear straight when he bridles his head; for if, on the contrary, it bends like a bow on his bridling, it is not formed for a free passage of the breath. This defect in a horse is expressed among the dealers by the phrase *cock-throppled*. The head should be so set on to the neck, that a space may be felt between the neck and the chine; when there is no such space, the horse is said to be bull-necked; and this is not only a blemish in the beauty of the horse, but it also occasions his wind

not to be so good. The crest should be strong, firm, and well raised; the neck should be straight and firm, not loose and pliant; the breast should be strong and broad, the ribs round like a barrel, the fillets large, the buttocks rather oval than broad, the legs clean, flat, and straight; and, finally, the mane and tail ought to be long and thin, not short and bushy, the last being counted a mark of dulness. When a hunter is thus chosen, and has been taught such obedience that he will readily answer to the rider's signals both of the bridle and hand, the voice, the calf of the leg, and the spurs; that he knows how to make his way forward, and has gained a true temper of mouth, and a right placing of his head, and has learned to stop and to turn readily, if his age be sufficiently advanced, he is ready for the field. It is a rule with all staunch sportsmen, that no horse should be used in hunting till he is full five years old; some will hunt them at four, but the horse at this time is not come up to his true strength and courage, and will not only fail at every tough trial, but will be subject to strains and accidents of that kind, much more than if he were to be kept another year first, when his strength would be more confirmed.

When the hunter is five years old, he may be put to grass from the middle of May till Bartholomew-tide; for the weather between these is so hot, that it will be very proper to spare him from work. At Bartholomew-tide, the strength of the grass beginning to be nipped by frosts and cold dews, so that it is apt to engender crudities in the horse, he should be taken up, while his coat is yet smooth and sleek, and put into the stable. When he is first brought home, he should be put in some secure and spacious place, where he may evacuate his body by degrees, and be brought not all at once to the warm keeping; the next night he may be stabled up. It is a general rule with many not to clothe and stable up their horses till two or three days after they are taken from grass, and others who put them in the stable after the first night, yet will not dress and clothe them till three or four days afterward; but all this, except the keeping the horse one day in a large and cool place, is needless caution.

There is a general practice among the grooms, in many places, of giving their hunters wheat-straw as soon as they take them up from grass. They say they do this to take up their bellies; but there seems much reason to disapprove of this. The change is very violent, and the nature of the straw so heating and drying, that there seems great reason to fear that the astringent nature of it would be prejudicial, more than is at first perceived. It is always found that the dung is hard after this food, and is voided with pain and difficulty, which is in general very wrong for this sort of horse. It is better therefore to avoid this straw-feeding, and to depend upon moderate airing, warm clothing, and good old hay and old corn, than to have recourse to any thing of this kind.

When the horse has evacuated all his grass, and has been properly shod, and the shoes have had time to settle to his feet, he may be ridden abroad, and treated in this manner: The groom ought to visit him early in the morning, at five o'clock in the long days, and at six in the short ones; he must then clean out the stable, and feel the horse's neck, flank, and belly, to find the state of his health. If the flank feels soft and flabby, there is a necessity of good diet to harden it, otherwise any great exercise will occasion swellings and puffiness in the heels. After this examination, a handful or two of good old oats, well sifted, should be given him; this will make him have more inclination to water, and will also make the water sit better on his stomach, than if he drank fasting. After this he is to be tied up and dressed. If in the doing of this he opens his mouth, as if he would bite, or attempts to kick at the person, it is a proof that the teeth of the curry-comb are too sharp, and must be filed blunter. If after this he continues the same tricks,

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it is through wantonness, and he should be corrected for it with the whip. The intent of currying being only to raise the dust, this is to be brushed off afterwards with a horse-tail nailed to a handle, or any other light brush. Then he is to be rubbed down with the brush, and dusted a second time; he should then be rubbed over with a wet hand, and all the loose hairs, and whatever foulness there is, should be picked off. When this is done, and he is wiped dry as at first, a large saddle-cloth is to be put on, reaching down to the spurring place; then the saddle is to be put on, and a cloth thrown over it, that he may not take cold: then rub down his legs, and pick his feet with an iron picker, and let the mane and tail be combed with a wet mane-comb. Lastly, it is a custom to spurt some beer in his mouth just before the leading him out of the stable. He should then be mounted, and walked a mile at least to some running water, and there watered; but he must only be suffered to take about half his water at one drinking.

It is the custom of many to gallop the horse at a violent rate as soon as he comes out of the water; but this is extremely wrong, for many reasons. It endangers the breaking a horse's wind more than any other practice, and often has been the occasion of destroying very good horses. It uses them also to the disagreeable trick we find in many horses, of running away as soon as ever they come out of the water: and with some it makes them averse to drinking, so that they will rather endure thirst, and hurt themselves greatly by it, than bring on the violent exercise which they remember always follows it. The better way is to walk him a little after he is out of the water, then put him to a gentle gallop for a little while, and after this to bring him to the water again. This should be done three or four times, till he will not drink any more. If there is a hilly place near the watering place, it is always well to ride up to it; if otherwise, any place is to be chosen where there is free air and sun. That the creature may enjoy the benefit of this, he is not to be galloped, but walked about in this place an hour, and then taken home to the stable. The pleasure the horse himself takes in these airings when well managed is very evident; for he will gape, yawn, and shrug up his body: and in these, whenever he would stand still to stale, dung, or listen to any noise, he is not to be hindered from it, but encouraged in every thing of this kind.

The advantages of these airings are very evident; they purify the blood, teach the creature how to make his breathing agree with the rest of the motions of his body, and give him an appetite to his food, which hunters and racers that are kept stalled up are otherwise very apt to lose. On returning from airing, the litter of the stable should be fresh, and by stirring this and whistling, he will be brought to stale. Then he is to be led to his stall, and tied up, and again carefully rubbed down; then he should be covered with a linen cloth next his body, and a canvas one over that, made to fit him, and reaching down to his legs. This, as the duke of Newcastle observes, is a custom which we learned of the Turks, who are of all people the most nice and careful of their horses. Over this covering there should be put a body-cloth of six or eight straps; this keeps his belly in shape, and does not hurt him. This clothing will be sufficient while the weather is not very sharp; but in severe seasons, when the hair begins to rise and start in the uncovered parts, a woollen cloth is to be added, and this will always prove fully sufficient.

Different horses, and different seasons, make variety of the degree of clothing necessary; but there always is an obvious rule to point out the necessary changes, the roughness of the coat being a mark of the want of clothing, and the smoothness of it a proof that the clothing is sufficient. Therefore if at any time the hair is found to start, it is a notice that some farther clothing is to be added.

If the horse sweat much in the night, it is a sign that he is over-fed, and wants exercise; this therefore is easily remedied. An hour or more after the horse is come in from his airing, the groom should give him a wisp of clean hay, making him eat it out of his hand; after this let the manger be well cleaned out, and a quartern of oats clean sifted be given him. If he eats up this with an appetite, he should have more given him; but if he is slow and indifferent about it, he must have no more. The business is to give him enough, but not to cloy him with food.

If the horse gets flesh too fast on this home feeding, he is not to be stinted to prevent it, but only his exercise increased; this will take down his flesh, and at the same time give him strength and wind. After the feeding in the morning is over, the stable is to be shut up, only leaving him a little hay on his litter. He need be no more looked at till one o'clock, and then only rubbed down, and left again to the time of his evening watering, which is four o'clock in the summer, and three in the winter. When he has been watered, he must be kept out an hour or two, or more if necessary, and then taken home and rubbed as after the morning watering. Then he is to have a feed of corn at six o'clock, and another at nine at night; and being then cleaned, and his litter put in order, and hay enough left for the night, he is to be left till morning. This is the direction for one day, and in this manner he is to be treated every day for a fortnight; at the end of which time, his flesh will be so hardened, his wind so improved, his mouth so quickened, and his gallop brought to so good a stroke, that he will be fit to put to moderate hunting. During the time that he is used to hunting, he must be ordered on his days of rest exactly as he is directed for the fortnight when he is in preparation; but as his exercise is now greatly increased, he must be allowed a more strengthening food, mixing some old split beans at every feeding with his oats. And if this is not found to be sufficient, the following bread must be given: Let two pecks of old beans and one peck of wheat be ground together, and made into an indifferently fine meal; then knead it into dough with some warm water and a good quantity of yeast; let it lie a time that it may rise and swell, which will make the bread the lighter; then make it into loaves of a peck each, and let it be baked in a slow oven, that it may be thoroughly done without being burnt; when it is taken out of the oven, it must be set bottom upwards to cool; when it is one day old, the crust is to be chipped off, and the crumb given him for food. When this is ready, he should have some of it at least once in the day: but it is not to be made the only food, but some feeds are to be of oats alone, some of oats and this bread, and some of oats and beans mixed together; the making a variety in this manner being the best of all methods of keeping up the appetite, which is often apt to fail.

The day before the horse is to hunt, he must have no beans, because they are hard of digestion, but only some oats with this bread; or if he will be brought to eat the bread alone, that will be best of all. His evening feed should on this day be somewhat earlier than usual; and after this he is only to have a wisp of hay out of the groom's hand till he return from hunting.

HUNTER (Dr. William), a celebrated anatomist and physician, was born on the 23d of May 1718, at Kilbride in the county of Lanerk in Scotland. He was the seventh of ten children of John and Agnes Hunter, who resided on a small estate in that parish called *Long Calderwood*, which had been long in the possession of his family. His great grandfather by his father's side, was a younger son of Hunter of Hunterston, chief of the family of that name. At the age of fourteen his father sent him to the college of Glasgow. In this seminary he passed five years; and by his prudent behaviour and diligence acquired the esteem of the professors, and the reputation of being

a good scholar. His father had designed him for the church; but the idea of subscribing to articles of faith was so repugnant to the liberal mode of thinking he had already adopted, that he felt an insuperable aversion to his theological pursuits. In this state of mind he happened to become acquainted with Dr. Cullen, the late celebrated professor at Edinburgh, who was then just established in practice at Hamilton under the patronage of the duke of Hamilton. Dr. Cullen's conversation soon determined him to lay aside all thoughts of the church, and to devote himself to the profession of physic. His father's consent having been previously obtained, Mr. Hunter, in 1737, went to reside with Dr. Cullen. In the family of this excellent friend and preceptor he passed nearly three years; and these, as he has been often heard to acknowledge, were the happiest years of his life. It was then agreed, that he should go and prosecute his medical studies at Edinburgh and London, and afterwards return to settle at Hamilton in partnership with Dr. Cullen. He accordingly set out for Edinburgh in November 1740; and continued there till the following spring, attending the lectures of the medical professors, and amongst others those of the late Dr. Alexander Monro, who many years afterwards, in allusion to this circumstance, styled himself his *old master*.

Mr. Hunter arrived in London in the summer of 1741, and took up his residence at Mr. afterwards Dr. Smellie's, who was at that time an apothecary in Pall Mall. He brought with him a letter of recommendation to his countryman Dr. James Douglas, from Mr. Foulis printer at Glasgow, who had been useful to the Doctor in collecting for him different editions of Horace. Dr. Douglas was then intent on a great anatomical work on the bones, which he did not live to complete, and was looking out for a young man of abilities and industry whom he might employ as a dissector. This induced him to pay particular attention to Mr. Hunter; and finding him acute and sensible, he desired him to make him another visit. A second conversation confirmed the Doctor in the good opinion he had formed of Mr. Hunter; and without any farther hesitation he invited him into his family, to assist in his dissections, and to superintend the education of his son. Mr. Hunter having accepted Dr. Douglas's invitation, was by his friendly assistance enabled to enter himself as a surgeon's pupil at St. George's Hospital under Mr. James Wilkie, and as a dissecting pupil under Dr. Frank Nichols, who at that time taught anatomy with considerable reputation. He likewise attended a course of lectures on experimental philosophy by Dr. Defaguliers. Of these means of improvement he did not fail to make a proper use. He soon became expert in dissection, and Dr. Douglas was at the expence of having several of his preparations engraved. But before many months had elapsed, he had the misfortune to lose this excellent friend. The death of Dr. Douglas, however, made no change in the situation of our author. He continued to reside with the Doctor's family, and to pursue his studies with the same diligence as before.

In 1743 he communicated to the Royal Society an essay on the Structure and Diseases of articulating Cartilages. This ingenious paper, on a subject which till then had not been sufficiently investigated, affords a striking testimony of the rapid progress he had made in his anatomical inquiries. As he had it in contemplation to teach anatomy, his attention was directed principally to this object; and it deserves to be mentioned as an additional mark of his prudence, that he did not precipitately engage in this attempt, but passed several years in acquiring such a degree of knowledge, and such a collection of preparations, as might insure him success. Dr. Nichols, to whom he communicated his scheme, and who declined giving lectures about that time in favour of the late Dr. Lawrence, did not give him much encouragement to prosecute it. But at

length an opportunity presented itself for the display of his abilities as a teacher. A society of navy surgeons had an apartment in Covent Garden, where they engaged the late Mr. Samuel Sharpe to deliver a course of lectures on the operations of surgery. Mr. Sharpe continued to repeat this course, till finding that it interfered too much with his other engagements, he declined the task in favour of Mr. Hunter; who gave the society so much satisfaction, that they requested him to extend his plan to anatomy, and at first he had the use of their room for his lectures. This happened in the winter of 1746. He is said to have experienced much solicitude when he began to speak in public: but the applause he met with soon inspired him with courage; and by degrees he became so fond of teaching, that for many years before his death he was never happier than when employed in delivering a lecture. The profits of his two first courses were considerable; but by contributing to the wants of different friends, he found himself at the return of the next season obliged to defer his lectures for a fortnight, merely because he had not money enough to defray the necessary expence of advertisements.

In 1747 he was admitted a member of the corporation of surgeons; and in the spring of the following year, soon after the close of his lectures, he set out in company with his pupil, Mr. James Douglas, on a tour through Holland to Paris. His lectures suffered no interruption by this journey, as he returned to England soon enough to prepare for his winter-course, which began about the usual time.

At first he practised both surgery and midwifery; but to the former of these he had always an aversion. His patron, Dr. James Douglas, had acquired considerable reputation in midwifery; and this probably induced Mr. Hunter to direct his views chiefly to the same line of practice. His being elected one of the surgeon men-midwives, first to the Middlesex, and soon afterwards to the British Lying-in-Hospital, assisted in bringing him forward in this branch of his profession, in which he was recommended by several of the most eminent surgeons of that time, who respected his anatomical talents and wished to encourage him. But these were not the only circumstances that contributed to his success. He owed much to his abilities, and much to his person and manner, which eminently qualified him for the practice of midwifery.

In 1750 he seems to have entirely relinquished his views in surgery; as in that year he obtained the degree of Doctor of Physic from the University of Glasgow, and began to practise as a physician. About this time he quitted the family of Mrs. Douglas, and went to reside in Jermyn-street. In the summer of 1751 he revisited his native country, for which he always retained a cordial affection. His mother was still living at Long Calderwood, which was now become his property by the death of his brother James. Dr. Cullen, for whom he always entertained a sincere regard, was then established at Glasgow, and had acquired considerable reputation both as a practitioner and teacher of physic; so that the two friends had the pleasure of being able to congratulate each other on their mutual prosperity. During this visit he showed his attachment to his little paternal inheritance, by giving many instructions for repairing and improving it, and for purchasing any adjoining lands that might be offered for sale. After this journey to Scotland, to which he devoted only a few weeks, he was never absent from London, unless his professional engagements, as sometimes happened, required his attendance at a distance from the capital.

In 1755, on the resignation of Dr. Layard, one of the physicians of the British Lying-in-hospital, we find the governors of that institution voting their "thanks to Dr. Hunter for the services he had done the hospital, and for his continuing in it as one of the physicians:" so that he seems to have been established

in this office without the usual form of an election. The year following he was admitted a licentiate of the Royal College of Physicians. Soon afterwards he was elected a member of the Medical Society; and to the *Observations and Inquiries* published by that society, he at different periods contributed several valuable papers.

In 1762 we find him warmly engaged in controversy, supporting his claim to different anatomical discoveries, in a work intitled *Medical Commentaries*, the style of which is correct and spirited. As an excuse for the tardiness with which he brought forth this work, he observes in his introduction, that it required a good deal of time, and he had little to spare; that the subject was unpleasant, and therefore he was very seldom in the humour to take it up. In this publication he confined himself chiefly to a dispute with the present learned professor of anatomy at Edinburgh, concerning injections of the testicle, the ducts of the lachrymal gland, the origin and use of the lymphatic vessels, and absorption by veins. He likewise defended himself against a reproach thrown upon him by professor Monro senior, by giving a concise account of a controversy he was involved in with Mr. Pott concerning the discovery of the *Hernia Congenita*. It was not long before Mr. Pott took occasion to give the public his account of the dispute; and, in reply, Dr. Hunter added a supplement to his commentaries. No man was ever more tenacious than Dr. Hunter of what he conceived to be his anatomical rights. This was particularly evinced in the year 1780, when his brother communicated to the Royal Society a discovery he had made 25 years before, relative to the structure of the placenta, the communication between it and the uterus, and the vascularity of the spongy chorion. At the next meeting of the society, a letter was read, in which Dr. Hunter put in his claim to the discovery in question. This letter was, followed by a reply from Mr. John Hunter, and here the dispute ended.

In 1762, when the queen became pregnant, Dr. Hunter was consulted: and two years afterwards he had the honour to be appointed physician extraordinary to her majesty. About this time his avocations were so numerous, that he became desirous of lessening his fatigue; and having noticed the ingenuity and assiduous application of the late Mr. William Hewson, F. R. S. who was then one of his pupils, he engaged him first as an assistant, and afterwards as a partner, in his lectures. This connexion continued till the year 1770; when some disputes happened, which terminated in a separation. Mr. Hewson was succeeded in the partnership by Mr. Cruikshank, whose anatomical abilities are deservedly respected.

In 1767 Dr. Hunter was elected a fellow of the Royal Society: and in the year following communicated to that learned body observations on the bones, commonly supposed to be elephants' bones, which have been found near the river Ohio in America. This was not the only subject of natural history on which our author employed his pen; for, in a subsequent volume of the *Philosophical Transactions*, we find him offering his remarks on some bones found in the rock of Gibraltar, and which he proves to have belonged to some quadruped. In the same work, likewise, he published an account of the *nyl-ghau*, an Indian animal not described before. In 1768 Dr. Hunter became a fellow of the Society of Antiquaries; and the same year, at the institution of a Royal Academy of Arts, he was appointed by his majesty to the office of professor of anatomy. This appointment opened a new field for his abilities; and he engaged in it, as he did in every other pursuit of his life, with unabating zeal. He now adapted his anatomical knowledge to the objects of painting and sculpture, and the novelty and justness of his observations proved at once the readiness and extent of his genius. In January 1781 he was unanimously elected to succeed the late Dr. John Fothergill as president of the Me-

dical Society. As his name and talents were known and respected in every part of Europe, so the honours conferred on him were not limited to his own country. In 1780 the Royal Medical Society at Paris elected him one of their foreign associates; and in 1782 he received a similar mark of distinction from the Royal Academy of Sciences in that city.

The most splendid of Dr. Hunter's medical publications was the *Anatomy of the Human Gravid Uterus*. The appearance of this work, which had been begun so early as the year 1751 (at which time 10 of the 34 plates it contains were completed), was retarded till the year 1775, only by the author's desire of sending it into the world with fewer imperfections. This great work is dedicated to the king. In his preface to it, we find the author very candidly acknowledging, that in most of the dissections he had been assisted by his brother Mr. John Hunter, "whose accuracy (he adds) in anatomical researches is so well known, that, to omit this opportunity of thanking him for that assistance, would be in some measure to disregard the future reputation of the work itself." He likewise confesses his obligations to the ingenious artists who made the drawings and engravings; "but particularly to Mr. Strange, not only for having by his hand secured a sort of immortality to two of the plates, but for having given his advice and assistance in every part with a steady and disinterested friendship. An anatomical description of the gravid uterus was a work which Dr. Hunter had in contemplation to give the public. He had likewise long been employed in collecting and arranging materials for a history of the various concretions that are formed in the human body. Amongst Dr. Hunter's papers were found two excellent introductory lectures on anatomy, which have been published by his nephew Dr. Matthew Baillie. Besides these manuscripts, he has also left behind him a considerable number of cases of dissection; mostly relating to pregnant women.

The same year in which the *Tables of the Gravid Uterus* made their appearance, Dr. Hunter communicated to the Royal Society an *Essay on the Origin of the Venereal Disease*. In this paper he attempted to prove, that this dreadful malady was not brought from America to Europe by the crew of Columbus, as had been commonly supposed, although it made its first appearance about that period. After this paper had been read to the Royal Society, Dr. Hunter, in a conversation with the late Dr. Musgrave, was convinced that the testimony on which he placed his chief dependence was of less weight than he had at first imagined, as many of Martyr's letters afford the most convincing proofs of their having been written a considerable time after the period of their dates. He therefore very properly laid aside his intention of giving his essay to the public. In the year 1777 Dr. Hunter joined with Mr. Watson in presenting to the Royal Society a short account of the late Dr. Maty's illness, and of the appearances on dissection; and the year following he published his *Reflections on the Section of the Symphysis Pubis*.

We must now go back a little into the order of time to describe the origin and progress of Dr. Hunter's museum, without some account of which the history of his life would be very incomplete. When he began to practise midwifery, he was desirous of acquiring a fortune sufficient to place him in easy and independent circumstances. Before many years had elapsed, he found himself in possession of a sum adequate to his wishes in this respect; and this he set apart as a resource of which he might avail himself whenever age or infirmities should oblige him to retire from business. After he had obtained this competency, as his wealth continued to accumulate, he formed a laudable design of engaging in some scheme of public utility, and at first had it in contemplation to found an anatomical school in this metropolis. For this purpose, about the year 1765, during the administration of Mr. Grenville, he presented a me-

morial to that minister, in which he requested the grant of a piece of ground in the Mews, for the site of an anatomical theatre. Dr. Hunter undertook to expend 7000*l.* on the building, and to endow a professorship of anatomy in perpetuity. This scheme did not meet with the reception it deserved. In a conversation on this subject soon afterwards with the earl of Shelburne, his lordship expressed a wish that the plan might be carried into execution by subscription, and very generously requested to have his name set down for a thousand guineas. Dr. Hunter's delicacy would not allow him to adopt this proposal. He chose rather to execute it at his own expence; and accordingly purchased a spot of ground in Great Windmill-street, where he erected a spacious house, to which he removed from Jernyn-street in 1770. In this building, besides a handsome amphitheatre and other convenient apartments for his lectures and dissections, there was one magnificent room, fitted up with great elegance and propriety as a museum. Of the magnitude and value of his anatomical collection some idea may be formed, when we consider the great length of years he employed in the making of anatomical preparations and in the dissection of morbid bodies, added to the eagerness with which he procured additions from the collections of Sandys, Hewson, Falconer, Blackall, and others, that were at different times offered for sale in this metropolis. His specimens of rare diseases were likewise frequently increased by presents from his medical friends and pupils; who, when any thing of this sort occurred to them, very justly thought they could not dispose of it more properly than by placing it in Dr. Hunter's museum. Speaking of an acquisition in this way in one of his publications, he says, "I look upon every thing of this kind which is given to me, as a present to the public; and consider myself as thereby called upon to serve the public with more diligence."

Before his removal to Windmill-street, he had confined his collection chiefly to specimens of human and comparative anatomy and of diseases; but now he extended his views to fossils, and likewise to the promotion of polite literature and erudition. In a short space of time he became possessed of "the most magnificent treasure of Greek and Latin books that has been accumulated by any person now living since the days of Mead." A cabinet of ancient medals contributed likewise much to the richness of his museum. A description of part of the coins in this collection, struck by the Greek free cities, has lately been published by the Doctor's learned friend Mr. Combe. In a classical dedication of this elegant volume to the queen, Dr. Hunter acknowledges his obligations to her majesty. In the preface some account is given of the progress of the collection, which has been brought together since the year 1770 with singular taste, and at the expence of upwards of 20,000*l.* In 1781 the museum received a valuable addition of shells, corals, and other curious subjects of natural history, which had been collected by the late worthy Dr. Fothergill, who gave directions by his will, that his collection should be appraised at 1000*l.* under the valuation. This was accordingly done, and Dr. Hunter purchased it for the sum of 1200*l.* The fame of this museum spread throughout Europe. Few foreigners distinguished for their rank or learning visited this metropolis without requesting to see it. Men of science of our own country always had easy access to it. Considered in a collective point of view, it is perhaps without a rival.

Dr. Hunter, at the head of his profession, honoured with the esteem of his sovereign, and in possession of every thing that reputation and wealth could confer, seemed now to have attained the summit of his wishes. But these sources of gratification were embittered by a disposition to the gout, which harassed him frequently during the latter part of his life, notwithstanding his very abstemious manner of living. On Saturday the

15th of March 1783, after having for several days experienced a return of a wandering gout, he complained of great head-ach and nausea. In this state he went to bed, and for several days felt more pain than usual both in his stomach and limbs. On the Thursday following he found himself so much recovered, that he determined to give the introductory lecture to the operations of surgery. It was to no purpose that his friends urged to him the impropriety of such an attempt. He was determined to make the experiment, and accordingly delivered the lecture; but towards the conclusion his strength was so exhausted that he fainted away, and was obliged to be carried to bed by two servants. The following night and day his symptoms were such as indicated danger; and on Saturday morning Mr. Combe, who made him an early visit, was alarmed on being told by Dr. Hunter himself that during the night he had certainly had a paralytic stroke. As neither his speech nor his pulse were affected, and he was able to raise himself in bed, Mr. Combe encouraged him to hope that he was mistaken. But the event proved the Doctor's idea of his complaint to be but too well founded; for from that time till his death, which happened on Sunday the 30th of March, he voided no urine without the assistance of the catheter, which was occasionally introduced by his brother; and purgative medicines were administered repeatedly without procuring a passage by stool. These circumstances, and the absence of pain, seemed to show, that the intestines and urinary bladder had lost their sensibility and power of contraction; and it was reasonable to presume that a partial palsy had affected the nerves distributed to those parts.

By his will, the use of his museum, under the direction of trustees, devolved to his nephew Matthew Baillie, and in case of his death to Mr. Cruikshank for the term of thirty years, at the end of which period the whole collection is bequeathed to the university of Glasgow. He left the sum of 8000*l.* as a fund for the support and augmentation of the collection.

Dr. Hunter was regularly shaped, but of a slender make, and rather below a middle stature. His manner of living was extremely simple and frugal, and the quantity of his food was small as well as plain. He was an early riser; and when business was over, was constantly engaged in his anatomical pursuits, or in his museum. There was something very engaging in his manner and address; and he had such an appearance of attention to his patients, when he was making his inquiries, as could hardly fail to conciliate their confidence and esteem. In consultation with his medical brethren, he delivered his opinions with diffidence and candour. In familiar conversation he was cheerful and unassuming. As a teacher of anatomy he became most deservedly celebrated. He was a good orator; and having a clear and accurate conception of what he taught, he knew how to place in distinct and intelligible points of view the most abstruse subjects of anatomy and physiology. Among other methods of explaining and illustrating his doctrines, he used frequently to introduce some apposite story or case that had occurred to him in his practice; and few men had acquired a more interesting fund of anecdotes of this kind, or related them in a more agreeable manner.

HUNTING, the exercise or diversion of pursuing four-footed beasts of game. See the article GAME. Four-footed beasts are hunted in the fields, woods, and thickets, and that both with guns and grey-hounds. Birds, on the contrary, are either shot in the air, or taken with nets and other devices, which exercise is called *fowling*; or they are pursued and taken by birds of prey, which is called *hawking*. See the articles FOWLING, HAWKING, FALCONRY, SHOOTING, BIRD-Catching, and DECOY, &c.

L' de Launay, professor of the French laws, has an express treatise of hunting. From those words of God to Adam, Gen. i. 26 and 28. and to Noah, Gen. ix. 2, 3. hunting was con-

sidered as a right devolved or made over to man; and the following ages appear to have been of the same sentiment. Accordingly we find, that among the more civilized nations it made one of their diversions; and as to the wilder and more barbarous, it served them with food and necessaries. The Roman jurisprudence, which was formed on the manners of the first ages, made a law of it, and established it as a maxim, that as the natural right of things which have no master belongs to the first possessor, wild beasts, birds, and fishes, are the property of whoever can take them first.

But the northern nations of barbarians who over-ran the Roman empire, bringing with them a stronger taste for the diversion, and the people being now possessed of other and more easy means of subsistence from the lands and possessions of those they had vanquished, their chiefs and leaders began to appropriate the right of hunting, and, instead of a natural right, to make it a royal one. Thus it continues to this day; the right of hunting, among us, belonging only to the king, and those who derive it from him.

The hunting used by the ancients was much like that now practised for the rein-deer; which is seldom hunted at force, or with hounds; but only drawn with a blood-hound, and forestalled with nets and engines. Thus did they with all beasts; whence a dog is never commended by them for opening before he has discovered where the beast lies. Hence, they were not in any manner curious as to the music of their hounds, or the composition of their kennel or pack, either for deepness, loudness, or sweetness of cry, which is a principal point in the hunting of our days. Their huntsmen, indeed, were accustomed to shout and make a great noise, as Virgil observes in the third of his Georgics: *Ingentem clamore preme ad retia cer-vum*. But that confusion was only to bring the deer to the nets laid for him.

The Sicilian way of hunting had something in it very extraordinary. The nobles or gentry being informed which way a herd of deer passed, gave notice to one another, and appointed a meeting; every one bringing with him a cross bow or long-bow, and a bundle of staves shod with iron, the heads bored, with a cord passing through them all: thus provided, they came to the herd, and, casting themselves about in a large ring, surrounded the deer. Then, each taking his stand, unbound his faggot, set up his stake, and tied the end of the cord to that of his next neighbour, at the distance of ten feet from one another. Then taking feathers, dyed in crimson, and fastened on a thread, they tied them to the cord; so that with the least breath of wind they would whirl round. Which done, the persons who kept the stands withdrew, and hid themselves in the next covert. Then the chief ranger entering within the line with hounds to draw after the herd, roused the game with their cry; which flying towards the line, were turned off, and, still gazing on the shaking and shining feathers, wandered about as if kept in with a real wall or pale. The ranger still pursued, and calling every person by name as he passed by their stand, commanded him to shoot the first, third, or sixth, as he pleased: and if any of them missed, or singled out another than that assigned him, it was accounted a grievous disgrace. By such means, as they passed by the several stations, the whole herd was killed by the several hands. *Pier. Hieroglyphic. lib. vii. cap. 6.*

Hunting formed the greatest part of the employment of the ancient Germans, and probably of the Britons also, when they were not engaged in war. We are informed by some ancient historians, that this was the case even as late as the third century with the unconquered Britons who lived beyond Adrian's wall; nay, that they subsisted chiefly by the prey they took in this way. The great attachment shown by all the Celtic nations to hunting, however, proceeded most probably from its being a kind of apprenticeship to war. Thus their youth ac-

quired that courage, strength, swiftness, and dexterity in handling their arms, which made them so formidable in time of war to their enemies. Thus also they freed the country from many mischievous animals which abounded in the forests, furnishing themselves also with materials for those feasts which seem to have constituted their greatest pleasure. The young chieftains had thus likewise an opportunity of paying court to their mistresses, by displaying their bravery and agility, and making them presents of their game; nay, so strong and universal was the passion for hunting among the ancient Britons, that young ladies of the highest quality and greatest beauty spent much of their time in the chase. They employed much the same weapons in hunting that they did in war, viz. long spears, javelins, and bows and arrows; having also great numbers of dogs to assist them in finding and pursuing their game. These dogs, we are also told, were much admired among other nations, on account of their swiftness, strength, fierceness, and exquisite sense of smelling. They were of several different kinds, called by different names, and formed a considerable article of commerce. They were highly valued by all the Celtic nations, insomuch that some very comical penalties were inflicted upon those who were convicted of stealing them. From the poems of Ossian also it appears, that the Britons were not unacquainted with the art of catching birds with hawks trained for that purpose; but they seem to have been absolutely ignorant of the method of catching fish; for there is not a single allusion to this art in all the works of that venerable bard. Their ignorance of this art is both confirmed and accounted for by Dio Niceus, who assures us, that the ancient Britons never tasted fish, though they had innumerable multitudes in their seas, rivers, and lakes. "By the by (says Dr. Henry), we may observe that this agreement between the poems of Ossian and the Greek historian, in a circumstance so singular, is at once a proof of the genuine antiquity of these poems, and that the Greek and Roman writers were not so ill informed about the affairs and manners of the ancient Britons as some have imagined."

The Mexicans, whatever imbecility may be imputed to them in other respects, were very dexterous in hunting. They used bows and arrows, darts, nets, snares, and a kind of tubes named *carbottane*, through which they shot by blowing out little balls at birds. Those which the kings and great men made use of were curiously carved and painted, and likewise adorned with gold and silver. Besides the exercise of the chase which private individuals took either for amusement or to provide food for themselves, there were general hunting-matches, sometimes appointed by the king; at others, undertaken with a view to provide plenty of victims for sacrifices. A large wood, generally that of Zacatapec, not far distant from the capital, was pitched upon as the scene of these grand hunting-matches. Here they chose the place best adapted for setting a great number of snares and nets. The wood was inclosed by some thousands of hunters, forming a circle of six, seven, or eight miles, according to the number of animals they intended to take. Fire was then set to the grass in a great number of places, and a terrible noise made with drums, horns, shouting, and whistling. The hunters gradually contracted their circle, continuing the noise till the game were inclosed in a very small space. They were then killed or taken in snares, or with the hands of the hunters. The number of animals taken or destroyed on these occasions was so great, that the first Spanish viceroy of Mexico would not believe it without making the experiment himself. The place chosen for his hunting-match was a great plain in the country of the Otomies, lying between the villages of Xilotepec and S. Giovanni del Rio; the Indians being ordered to proceed according to their usual customs in the times of their paganism. The viceroy, attended by a vast retinue of

Spaniards, repaired to the place appointed, where accommodations were prepared for them in houses of wood erected for the purpose. A circle of more than 15 miles was formed by 11,000 Otomies, who started such a quantity of game on the plain, that the viceroy was quite astonished, and commanded the greater part of them to be set at liberty; which was accordingly done. The number retained, however, was still incredibly great, were it not attested by a witness of the highest credit. On this occasion they kept 600 deer and wild goats, 100 cajotes, with a surprising number of hares, rabbits, and other smaller animals. The plain still retains the Spanish name *Cazadero*, which signifies the "place of the chase."

The Mexicans, besides the usual methods of the chase, had particular contrivances for catching certain animals. Thus, to catch young asses, they made a small fire in the woods, putting among the burning coals a particular kind of stone named *cacalotl*, "raven or black stone," which bursts with a loud noise when heated. The fire was covered with earth, and a little maize laid around it. The asses quickly assembled with their young, in order to feed upon the maize; but while they were thus employed the stone burst, and scared away the old ones by the explosion, while the young ones, unable to fly, were carried off by the hunters. Serpents were taken even by the hands, seizing them intrepidly by the neck with one hand, and sewing up their mouths with the other. This method is still practised. They showed the greatest dexterity in tracing the steps of wild beasts, even when an European could not have discerned the smallest print of their feet. The Indian method, however, was by observing sometimes the herbs or leaves broken down by their feet; sometimes the drops of blood which fell from them when wounded. It is said that some of the American Indians show still greater dexterity in discovering the tracks of their enemies, which to an European would be altogether imperceptible.

Hunting was a favourite diversion of the great and bloody conqueror Jenghiz Khan, if indeed we can apply the word *diversion* to a monster whose mind was set upon the destruction of his own species, and who only endeavoured to make the murder of brutes subservient to that of men, by keeping his soldiers in a kind of warfare with the beasts when they had no human enemies to contend with. His expeditions were conducted on a plan similar to that of the Mexicans already mentioned; and were no doubt attended with still greater success, as his numerous army could inclose a much greater space than all the Indians whom the Spanish viceroy could muster. The East Indian princes still show the same inclination to the chase; and Mr. Blane, who attended the hunting excursions of Asoph Ul Dowlah, vizir of the Mogul empire and nabob of Oude in 1785 and 1786, gives the following account of the method practised on this occasion:

"The time chosen for the hunting party is about the beginning of December; and the diversion is continued till the heats, which commence about the beginning of March, oblige them to stop. During this time a circuit of between 400 and 600 miles is generally made; the hunters bending their course towards the skirts of the northern mountains, where the country is wild and uncultivated. The vizir takes along with him not only his court and seraglio, but a great part of the inhabitants of his capital. His immediate attendants may amount to about 2000; but besides these he is also followed by 500 or 600 horse, and several battalions of regular sepoys with their field pieces. Four or five hundred elephants are also carried along with him; of which some are used for riding, others for fighting, and some for clearing the jungles and forests of the game. About as many sumpter horses of the beautiful Persian and Arabian breeds are carried along with him. A great many wheel carriages drawn by bullocks likewise attend, which are

used chiefly for the convenience of the women; sometimes also he has an English chaise or two, and sometimes a chariot; but all these as well as the horses are merely for show, the visir himself never using any other conveyance than an elephant, or sometimes when fatigued or indisposed a palanquin. The animals used in the sport are principally gre-hounds, of which there may be about 300; he has also about 200 hawks, and a few trained leopards for hunting deer. There are a great number of marksmen, whose profession it is to shoot deer; with many fowlers, who provide game; as none of the natives of India know how to shoot game with small shot, or to hunt with slow hounds. A vast number of matchlocks are carried along with the company, with many English pieces of various kinds, 40 or 50 pairs of pistols, bows and arrows, besides swords, daggers, and sabres without number. There are also nets of various kinds, some for quail, and others very large for fishing, which are carried along with him upon elephants, attended by fishermen, so as always to be ready for throwing into any river or lake that may be met with. Every article that can contribute to luxury or pleasure is likewise carried along with the army. A great many carts are loaded with the Ganges water, and even ice is transported for cooling the drink. The fruits of the season and fresh vegetables are daily sent to him from his gardens by bearers stationed at the distance of every ten miles; by which means each article is conveyed day or night at the rate of four miles an hour. Besides the animals already mentioned, there are also fighting antelopes, buffaloes, and rams in great numbers; also several hundred pigeons, some fighting cocks, with a vast variety of parrots, nightingales, &c.

"To complete the magnificence or extravagance of this expedition, there is always a large bazar, or moving town, which attends the camp; consisting of shop-keepers and artificers of all kinds, money-changers, dancing-women; so that, on the most moderate calculation, the whole number of people in his camp cannot be computed at fewer than 20,000. The nabob himself, and all the gentlemen of his camp, are provided with double sets of tents and equipage, which are always sent on the day before to the place to which he intends to go; and this is generally eight or ten miles in whatever direction most game is expected; so that by the time he has finished his sport in the morning, he finds his whole camp ready pitched for his reception.

"The nabob and the attending gentlemen proceed in a regular moving court or durbar, and thus they keep conversing together and looking out for game. A great many foxes, hares, jackals, and sometimes deer, are picked up by the dogs as they pass along: the hawks are carried immediately before the elephants, and let fly at whatever game is sprung for them, which is generally partridges, bustards, quails, and different kinds of herons; these last affording excellent sport with the falcons or sharp-winged hawks. Wild boars are sometimes started, and either shot or run down by the dogs and horsemen. Hunting the tyger, however, is looked upon as the principal diversion, and the discovery of one of these animals is accounted a matter of great joy. The cover in which the tyger is found is commonly long grass, or reeds of such an height as frequently to reach above the elephants; and it is difficult to find him in such a place, as he commonly endeavours either to steal off, or lies so close to the ground that he cannot be roused till the elephants are almost upon him. He then roars and skulks away, but is shot at as soon as he can be seen; it being generally contrived that the nabob shall have the compliment of firing first. If he be not disabled, the tyger continues to skulk along, followed by the line of elephants; the nabob and others shooting at him as often as he can be seen till he falls. The elephants themselves are very much afraid of this terrible animal, and discover their apprehensions by shrieking and roaring as soon as

they begin to smell him or hear him growl; generally attempting to turn away from the place where he is. When the tyger can be traced to a particular spot, the elephants are disposed of in a circle round him; in which case he will at last make a desperate attack, springing upon the elephant that is nearest, and attempting to tear him with his teeth or claws. Some, but very few, of the elephants, can be brought to attack the tyger; and this they do by curling up their trunks under their mouths, and then attempting to toss, or otherwise destroy him with their tusks, or to crush him with their feet or knees. It is considered as good sport to kill one tyger in a day; though sometimes, when a female is met with her young ones, two or three will be killed."

The other objects of pursuit in these excursions are wild elephants, buffaloes, and rhinoceroses. Our author was present at the hunting of a wild elephant of vast size and strength. "An attempt was first made to take him alive by surrounding him with tame elephants, while he was kept at bay by crackers and other fire-works; but he constantly eluded every effort of this kind. Sometimes the drivers of the tame elephants got so near him, that they threw strong ropes over his head, and endeavoured to detain him by fastening them around trees; but he constantly snapped the ropes like pack-threads, and pursued his way to the forest. Some of the strongest and most furious of the fighting elephants were then brought up to engage him: but he attacked them with such fury that they were all obliged to desist. In his struggle with one of them he broke one of his tusks; and the broken piece, which was upwards of two inches in diameter, of solid ivory, flew up into the air several yards above their heads. Orders were now given to kill him, as it appeared impossible to take him alive; but even this was not accomplished without the greatest difficulty. He twice turned and attacked the party who pursued him; and in one of these attacks struck the elephant obliquely on which the prince rode, threw him upon his side, but then passed on without offering farther injury. At last he fell dead, after having received as was supposed upwards of a thousand balls into his body.

Notwithstanding the general passion among most nations for hunting, however, it has by many been deemed an exercise inconsistent with the principles of humanity. The late king of Prussia expressed himself on this subject in the following manner: "The chase is one of the most sensual of pleasures, by which the powers of the body are strongly exerted, but those of the mind remain unemployed. It is an exercise which makes the limbs strong, active, and pliable; but leaves the head without improvement. It consists in a violent desire in the pursuit, and the indulgence of a cruel pleasure in the death, of the game. I am convinced, that man is more cruel and savage than any beast of prey: We exercise the dominion given us over these our fellow-creatures in the most tyrannical manner. If we pretend to any superiority over the beasts, it ought certainly to consist in reason; but we commonly find that the most passionate lovers of the chase renounce this privilege, and converse only with their dogs, horses, and other irrational animals. This renders them wild and unfeeling; and it is probable that they cannot be very merciful to the human species. For a man who can in cold blood torture a poor innocent animal, cannot feel much compassion for the distresses of his own species. And, besides, can the chase be a proper employment for a thinking mind?"

The arguments used by this monarch against hunting seem indeed to be much confirmed by considering the various nations who have most addicted themselves to it. These, as must be seen from what has already been said, were all barbarous; and it is remarkable, that Nimrod, the first great hunter of whom we have any account, was likewise the first who oppressed and enslaved his own species. As nations advanced in civilization,

it always became necessary to restrain by law the inclination of the people for hunting. This was done by the wise legislator Solon, lest the Athenians should neglect the mechanic arts on its account. The Lacedemonians, on the contrary, indulged themselves in this diversion without controul; but they were barbarians, and most cruelly oppressed those whom they had in their power, as is evident from their treatment of the Helots. The like may be said of the Egyptians, Persians, and Scythians; all of whom delighted in war, and oppressed their own species. The Romans, on the other hand, who were somewhat more civilized, were less addicted to hunting. Even they, however, were exceedingly barbarous, and found it necessary to make death and slaughter familiar to their citizens from their infancy. Hence their diversions of the amphitheatre and circus, where the hunting of wild beasts was shown in the most magnificent and cruel manner; not to mention their still more cruel sports of gladiators, &c.

In two cases only does it seem possible to reconcile the practice of hunting with humanity; viz. either when an uncultivated country is over-run with noxious animals; or when it is necessary to kill wild animals for food. In the former case, the noxious animals are killed because they themselves would kill if they were allowed to live; but if we kill even a lion or a tiger merely for the pleasure of killing him, we are undoubtedly chargeable with cruelty. In like manner, our modern fox-hunters expressly kill foxes, not in order to destroy the breed of these noxious animals, but for the pleasure of seeing them exert all their power and cunning to save their lives, and then beholding them torn in pieces after being half dead with fatigue.

As sportsmen have invented a set of terms which may not improperly be called the *hunting-language*, our readers would not deem this article complete were we to omit mentioning them.

1. Speaking of beasts as they are in company. They say, a *herd* of harts, and all manner of deer. A *hey* of roes. A *fouder* of swine. A *roust* of wolves. A *richess* of martens. A *brace* or *leash* of bucks, foxes, or hares. A *couple* of rabbits or coney.

2. For their lodging. A hart is said to *barbour*. A buck *lodges*. A roe *beds*. A hare *seats* or *forms*. A coney *sits*. A fox *kennels*. A marten *tree*s. An otter *watches*. A badger *earths*. A boar *couches*. Hence, to express their dislodging, they say, *Unbarbour* the hart. *Rouse* the buck. *Start* the hare. *Bolt* the coney. *Unkennel* the fox. *Untree* the marten. *Vent* the otter. *Dig* the badger. *Rear* the boar.

3. For their noise at rutting time. A hart *bellets*. A buck *growns* or *troats*. A roe *bellows*. A hare *beats* or *taps*. An otter *wbines*. A boar *freams*. A fox *barks*. A badger *sbrieks*. A wolf *howls*. A goat *rattles*.

4. For their copulation. A hart or buck goes to *rut*. A roe goes to *tourn*. A boar goes to *brim*. A hare or coney goes to *buck*. A fox goes to *clickitting*. A wolf goes to *match* or *make*. An otter *bunteth* for his kind.

5. For the footing and treading. Of a hart, we say the *slot*. Of a buck, and all fallow-deer, the *view*. Of all deer, if on the grafs and scarce visible, the *foiling*. Of a fox, the *print*; and of other the like vermin, the *footing*. Of an otter, the *marks*. Of a boar, the *track*. The hare, when in open field, is said to *fore*; when she winds about to deceive the hounds, she *dubbles*; when she beats on the hard highway, and her footing comes to be perceived, she *pricketh*: in snow, it is called the *trace* of the hare.

6. The tail of a hart, buck, or other deer, is called the *single*. That of a boar, the *wreath*. Of a fox, the *brush* or *drag*; and the tip at the end, the *chape*. Of a wolf, the *stern*. Of a hare and coney, the *scut*.

7. The ordure or excrement of a hart and all deer is called

fumets or *fumishing*. Of a hare, *crotils* or *crotifing*. Of a boar, *lesses*. Of a fox, the *billiving*; and of other the like vermin, the *fuants*. Of an otter, the *spraints*.

8. As to the attire of deer, or parts thereof, those of a stag, if perfect, are the *bur*, the *pearls*, the little *knobs* on it, the *beam*, the *gutters*, the *antler*, the *fur-antler*, *royal*, *fur-royal*, and all at top the *croches*. Of the buck, the *bur-beam*, *brow-antler*, *black-antler*, *advancer*, *palm*, and *spellers*. If the croches grow in the form of a man's hand, it is called a *palmed head*. Heads bearing not above three or four, and the croches placed aloft, all of one height, are called *crowned heads*. Heads having double croches, are called *forked heads*, because the croches are planted on the top of the beam like forks.

9. They say, a *litter* of cubs, a *nest* of rabbits, a squirrel's *dray*.

10. The terms used in respect of the dogs, &c. are as follow: Of gre-hounds, two make a *brace*; of hounds, a *couple*. Of gre-hounds, three make a *leash*; of hounds, a *couple* and *half*. They say, *let slip* a gre-hound; and, *cast off* a hound. The string wherein a gre-hound is led, is called a *leash*; and that of a hound, a *lyome*. The gre-hound has his *collar*, and the hound his *couples*. We say a *kennel* of hounds, and a *pack* of beagles.

Hunting, as practised among us, is chiefly performed with dogs; of which we have various kinds, accommodated to the various kinds of game, as *bounds*, *gre-bounds*, *blood bounds*, *terriers*, &c. See those articles. In the kennels or packs they generally rank them under the heads of *enterers*, *drivers*, *flyers*, *tyers*, &c. On some occasions, nets, spears, and instruments for digging the ground, are also required: nor is the hunting-horn to be omitted.

The usual chases among us are, the *hart*, *buck*, *roe*, *bare*, *fox*, *badger*, and *otter*. We shall here give something of what relates to each of these, first premising an explanation of some general terms and phrases, more immediately used in the progress of the sport itself; what belongs to the several sorts of game in particular being reserved for the respective articles.

When the hounds, then, being cast off, and finding the scent of some game, begin to open and cry; they are said to *challenge*. When they are too busy ere the scent be good, they are said to *babble*. When too busy where the scent is good, to *barwl*. When they run it endwise orderly, holding in together merrily, and making it good, they are said to be in *full cry*. When they run along without opening at all, it is called *running mute*.

When spaniels open in the string, or a gre-hound in the course, they are said to *lapse*. When beagles bark and cry at their prey, they are said to *yearn*. When the dogs hit the scent the contrary way, they are said to *draw amifs*. When they take fresh scent, and quit the former chase for a new one, it is called *hunting change*. When they *hunt* the game by the heel or track, they are said to *bunt count.r.* When the chase goes off, and returns again, traversing the same ground, it is called *bunting the foil*. When the dogs run at a whole herd of deer, instead of a single one, it is called *running riot*.

Dogs set in readiness where the game is expected to come by, and cast off after the other hounds are passed, are called a *relay*. If they be cast off ere the other dogs be come up, it is called *vauntlay*. When, finding where the chase has been, they make a proffer to enter, but return, it is called a *Ulemish*. A lesson on the horn to encourage the hounds, is named a *call*, or a *rebeat*. That blown at the death of a deer, is called the *mort*. The part belonging to the dogs of any chase they have killed, is the *reward*. They say, *take off* a deer's skin; *strip* or *case* a hare, fox, and all sorts of vermin; which is done by beginning at the snout, and turning the skin over the ears down to the tail.

Hunting is practised in a different manner, and with different

apparatus, according to the nature of the beasts which are hunted, a description of whom may be found under their respective articles, *infra*. With regard to the seasons, that for hart and buck-hunting begins a fortnight after midsummer, and lasts till Holy-rood day; that for the hind and doe, begins on Holy-rood day, and lasts till Candlemas; that for fox-hunting begins at Christmas, and holds till Lady-day; that for roe-hunting begins at Michaelmas, and ends at Christmas; hare-hunting commences at Michaelmas, and lasts till the end of February; and where the wolf and boar are hunted, the season for each begins at Christmas, the first ending at Lady-day, and the latter at the Purification.

When the sportsmen have provided themselves with nets, spears, and a hunting-horn to call the dogs together, and likewise with instruments for digging the ground, the following directions will be of use to them in the pursuit of each sort of game.

Badger-HUNTING. In doing this, you must seek the earths and burrows where he lies, and in a clear moonshine night go and stop all the burrows, except one or two, and therein place some sacks, fastened with drawing strings, which may shut him in as soon as he straineth the bag. Some use no more than to set a hoop in the mouth of the sack, and so put it into the hole; and as soon as the badger is in the sack and straineth it, the sack slippeth off the hoop and follows him to the earth, so he lies tumbling therein till he is taken. These sacks or bags being thus set, cast off the hounds, beating about all the woods, coppices, hedges, and tufts, round about, for the compass of a mile or two; and what badgers are abroad, being alarmed by the hounds, will soon betake themselves to their burrows: and observe, that he who is placed to watch the sacks, must stand close and upon a clear wind; otherwise the badger will discover him, and will immediately fly some other way into his burrow. But if the hounds can encounter him before he can take his sanctuary, he will then stand at bay like a boar, and make good sport, grievously biting and clawing the dogs; for the manner of their fighting is lying on their backs, using both teeth and nails; and blowing up their skins, defend themselves against all bites of the dogs, and blows of the men upon their noses. And for the better preservation of your dogs, it is good to put broad collars about their necks made of dried skins.

When the badger perceives the terriers to begin to yearn him in his burrow, he will stop the hole betwixt him and the terriers; and if they still continue baying, he will remove his couch into another chamber or part of the burrow, and so from one to another, barricading the way before them, as they retreat, until they can go no farther. If you intend to dig the badger out of his burrow, you must be provided with the same tools as for digging out a fox; and besides, you should have a pail of water to refresh the terriers, when they come out of the earth to take breath and cool themselves. It will also be necessary to put collars of bells about the necks of your terriers, which making a noise may cause the badger to bolt out. The tools used for digging out of the badger, being troublesome to be carried on men's backs, may be brought in a cart. In digging, you must consider the situation of the ground, by which you may judge where the chief angles are; for else, instead of advancing the work, you will hinder it. In this order you may besiege them in their holds, or castles; and may break their platforms, parapets, casemates, and work to them with mines and countermines until you have overcome them.

Boar-HUNTING. When a boar is roused out of the thicket, he always goes from it, if possible, the same way by which he came to it; and when he is once up, he will never stop till he comes to some place of more security. If it happens that a sinder of them are found together, when any one breaks away, the rest all follow the same way. When the boar is hunted in the

wood where he was bred, he will scarce ever be brought to quit it; he will sometimes make towards the sides to listen to the noise of the dogs, but retires into the middle again, and usually dies or escapes there. When it happens that a boar runs a-head, he will not be stopped or put out of his way, by man or beast, so long as he has any strength left. He makes no doubles nor crossings when chased; and when killed makes no noise, if an old boar; the fows and pigs will squeak when wounded.

The season for hunting the wild boar begins in September, and ends in December, when they go to rut. If it be a large boar, and one that has lain long at rest, he must be hunted with a great number of dogs, and those such as will keep close to him; and the huntsman, with his spear, should always be riding in among them, and charging the boar as often as he can, to discourage him: such a boar as this, with five or six couple of dogs, will run to the first convenient place of shelter, and there stand at bay and make at them as they attempt to come up with him. There ought always to be relays also set of the best and staunchest hounds in the kennel; for if they are of young eager dogs, they will be apt to seize him, and be killed or spoiled before the rest come up. The putting collars with bells about the dogs' necks is a great security for them; for the boar will not so soon strike at them when they have these, but will rather run before them. The huntsmen generally kill the boar with their swords or spears: but great caution is necessary in making the blows; for he is very apt to catch them upon his snout or tusks; and if wounded and not killed, he will attack the huntsman in the most furious manner. The place to give the wound with the spear is either between the eyes in the middle of the forehead, or in the shoulder; both these places make the wound mortal.

When this creature makes at the hunter, there is nothing for it but courage and address: if he flies for it, he is surely overtaken and killed. If the boar comes straight up, he is to be received at the point of the spear: but if he makes doubles and windings, he is to be watched very cautiously, for he will attempt getting hold of the spear in his mouth; and if he does so, nothing can save the huntsman but another person attacking him behind: he will on this attack the second person, and the first must then attack him again: two people will thus have enough to do with him; and were it not for the forks of the boar-spears that make it impossible to press forward upon them, the huntsman who gives the creature his death's wound would seldom escape falling a sacrifice to his revenge for it. The modern way of boar-hunting is generally to dispatch the creature by all the huntsmen striking him at once: but the ancient Roman way was, for a person on foot, armed with a spear, to keep the creature at bay; and in this case the boar would run of himself upon the spear to come at the huntsman, and push forward till the spear pierced him through.

Buck-HUNTING. Here the same hounds and methods are used as in running the stag; and, indeed, he that can hunt a hart or stag well, will not hunt a buck ill. In order to facilitate the chace, the game-keeper commonly selects a fat buck out of the herd, which he shoots in order to maim him, and then he is run down by the hounds.

As to the method of hunting the buck. The company generally go out very early for the benefit of the morning. Sometimes they have a deer ready lodged; if not, the coverts are drawn till one is roused: or sometimes in a park a deer is pitched upon, and forced from the herd, then more hounds are laid on to run the chace. If you come to be at a fault, the old staunch hounds are only to be relied upon till you recover him again: if he be sunk, and the hounds thrust him up, it is called an *imprime*, and the company all sound a recheat: when he is run down, every one strives to get in to prevent his

being torn by the hounds, fallow deer seldom or never standing at bay.

He that first gets in cries *hoo up!* to give notice that he is down, and blows a death. When the company are all come in, they paunch him, and reward the hounds; and generally the chief person of quality amongst them *takes say*, that is, cuts his belly open, to see how fat he is. When this is done, every one has a chop at his neck; and the head being cut off, is shewed to the hounds, to encourage them to run only at male deer, which they see by the horns, and to teach them to bite only at the head: then the company all standing in a ring, one blows a single death; which being done, all blow a double recheat, and so conclude the chace with a general halloo of hoo-up, and depart the field to their several homes, or to the place of meeting; and the huntsman, or some other, hath the deer cast across the buttocks of his horse, and so carries him home.

FOX-HUNTING, a very favourite exercise among our country gentlemen, is of two descriptions, viz. either above or below ground.

I. Above ground. To hunt a fox with hounds, you must draw about groves, thickets, and bushes near villages. When you find one, it will be necessary to stop up his earth the night before you design to hunt, and that about midnight; at which time he is gone out to prey: this may be done by laying two white sticks across in his way, which he will imagine to be some gin or trap laid for him; or else they may be stopped up with black thorns and earth mixed together.

Mr. Beckford is of opinion that for fox-hunting the pack should consist of 25 couple. The hour most favourable for the diversion is an early one; and he thinks that the hounds should be at the cover at sun-rising. The huntsman should then throw in his hounds as quietly as he can; and let the two whippers-in keep wide of him on either hand; so that a single hound may not escape them: let them be attentive to his halloo, and let the sportsmen be ready to encourage or rate as that directs. The fox ought on no account to be hallooed too soon, as in that case he would most certainly turn back again, and spoil all the sport. Two things our author particularly recommends, viz. the making all the hounds steady, and making them all draw. "Many huntmen (says he) are fond of having them at their horse's heels; but they never can get so well or so soon together as when they spread the cover: besides, I have often known, when there have been only a few finders, that they have found their fox gone down the wind, and been heard of no more that day. Much depends upon the first finding of your fox; for I look upon a fox well found to be half killed. I think people are generally in too great a hurry on this occasion. There are but few instances where sportsmen are not too noisy, and too fond of encouraging their hounds, which seldom do their business so well as when little is said to them. The huntsman ought certainly to begin with his foremost hounds; and I should wish him to keep as close to them as he conveniently can; nor can any harm arise from it, unless he should not have common sense. No hounds can then slip down the wind and get out of his hearing; he will also see how far they carry the scent, a necessary requisite; for without it he never can make a cast with any certainty. You will find it not less necessary for your huntsman to be active in pressing his hounds forward when the scent is good, than to be prudent in not hurrying them beyond it when it is bad. It is his business to be ready at all times to lend them that assistance which they so frequently need, and which when they are first at a fault is then most critical. A fox-hound at that time will exert himself most; he afterwards cools, and becomes more indifferent about his game. Those huntmen who do not get forward enough to take advantage of this eagerness and impetuosity, and direct it properly, seldom

know enough of hunting to be of much use to them afterwards. Though a huntsman cannot be too fond of hunting, a whipper-in easily may. His business will seldom allow him to be forward enough with the hounds to see much of the sport. His only thought therefore should be to keep the hounds together, and to contribute as much as he can to the killing of the fox: keeping the hounds together is the surest means to make them steady. When left to themselves they seldom refuse any blood they can get; they become conceited; learn to tie upon the scent; and besides this they frequently get a trick of hunting by themselves, and are seldom good for much afterwards.

"Every country is soon known; and nine foxes out of ten, with the wind in the same quarter, will follow the same track. It is easy therefore for the whipper-in to cut short, and catch the hounds again. With a high scent you cannot push on hounds too much. Screams keep the fox forward, at the same time that they keep the hounds together, or let in the tail-hounds: they also enliven the sport; and, if discreetly used, are always of service; but in cover they should be given with the greatest caution. Halloos seldom do any hurt when you are running up the wind, for then none but the tail-hounds can hear you: when you are running down the wind, you should halloo no more than may be necessary to bring the tail-hounds forward; for a hound that knows his business seldom wants encouragement when he is upon a scent. Most fox-hunters wish to see their hounds run in a *good style*. I confess I myself am one of those; I hate to see a string of them; nor can I bear to see them creep where they can leap. A pack of harriers, if they have time, may kill a fox: but I defy them to kill him in the style in which he ought to be killed; they must hunt him down. If you intend to tire him out, you must expect to be tired also yourself; I never wish a chace to be less than one hour, or to exceed two: it is sufficiently long if properly followed: it will seldom be longer unless there be a fault somewhere; either in the day, the huntsman, or the hounds.

"Changing from the hunted fox to a fresh one is as bad an accident as can happen to a pack of fox-hounds, and requires all the ingenuity and observation that man is capable of to guard against it. Could a fox-hound distinguish a hunted fox as the deer hound does the deer that is blown, fox-hunting would then be perfect. A huntsman should always listen to his hounds while they are running in cover; he should be particularly attentive to the headmost hounds, and he should be constantly on his guard against a skirter; for, if there be two scents, he must be wrong. Generally speaking, the best scent is least likely to be that of the hunted fox: and as a fox seldom suffers hounds to run up to him as long as he is able to prevent it; so, nine times out of ten, when foxes are hallooed early in the day, they are all fresh foxes. The hounds most likely to be right are the hard running line-hunting ones; or such as the huntsman knows had the lead before there arose any doubt of changing. With regard to the fox, if he break over an open country, it is no sign that he is hard run; for they seldom at any time will do that unless they are a great way before the hounds. Also if he run up the wind; they seldom or never do that when they have been long hunted and grow weak; and when they run their soil, that also may direct him. All this requires a good ear and nice observation; and indeed in that consists the chief excellence of a huntsman.

"When the hounds divide and are in two parts, the whipper-in, in stopping, must attend to the huntsman and wait for his halloo, before he attempts to stop either: for want of proper management in this respect I have known the hounds stopped at both places, and both foxes lost. If they have many scents, and it is quite uncertain which is the hunted fox, let him stop those that are farthest down the wind; as they can

hear the others, and will reach them soonest: in such a case there will be little use in stopping those that are up the wind. When hounds are at a check, let every one be silent and stand still. Whippers-in are frequently at this time coming on with the tail hounds. They should never halloo to them when the hounds are at fault; the least thing does them harm at such a time, but a halloo more than any other. The huntsman, at a check, had better let his hounds alone; or content himself with holding them forward, without taking them off their noses.—Should they be at a fault, after having made their own cast (which the huntsman should always first encourage them to do), it is then his business to assist them further; but except in some particular instances, I never approve of their being cast as long as they are inclined to hunt. The first cast I bid my huntsman make is generally a regular one, not choosing to rely entirely on his judgment: if that should not succeed, he is then at liberty to follow his own opinion, and proceed as observation or genius may direct. When such a cast is made, I like to see some mark of good sense and meaning in it; whether down the wind, or towards some likely cover or strong earth. However, as it is at best uncertain, I always wish to see a regular cast before I see a knowing one; which, as a last resource, should not be called forth till it be wanted. The letting hounds alone is but a negative goodness in a huntsman; whereas it is true this last shows real genius; and to be perfect, it must be born with him. There is a fault, however, which a knowing huntsman is too apt to commit: he will find a fresh fox, and then claim the merit of having recovered the hunted one. It is always dangerous to throw hounds into a cover to retrieve a lost scent; and, unless they hit him in, is not to be depended on.

"Gentlemen, when hounds are at fault, are too apt themselves to prolong it. They should always stop their horses some distance behind the hounds; and if it be possible to remain silent, this is the time to be so. They should be careful not to ride before the hounds or over the scent; nor should they ever meet a hound in the face unless with a design to stop him. Should you at any time be before the hounds, turn your horse's head the way they are going, get out of their track, and let them pass by you. In dry weather, and particularly in heathy countries, foxes will run the roads. If gentlemen at such times will ride close upon the hounds, they may drive them miles without any scent.—High-mettled fox hounds are seldom inclined to stop whilst horses are close at their heels. No one should ever ride in a direction which if persisted in would carry him amongst the hounds, unless he be at a great distance behind them.

"The first moment that hounds are at fault is a critical one for the sport people, who should then be very attentive. Those who look forward may perhaps see the fox; or the running of sheep, or the pursuit of crows, may give them some tidings of him. Those who listen may sometimes take a hint which way he is gone from the chattering of a magpie; or perhaps be at a certainty from a distant halloo: nothing that can give any intelligence at such a time ought to be neglected. Gentlemen are too apt to ride all together: were they to spread more, they might sometimes be of service; particularly those who, from a knowledge of the sport, keep down the wind: it would then be difficult for either hounds or fox to escape their observation.—You should, however, be cautious how you go to a halloo. The halloo itself must in a great measure direct you; and though it afford no certain rule, yet you may frequently guess whether it can be depended upon or not. At the sowing-time, when boys are keeping off the birds, you will sometimes be deceived by their halloo; so that it is best, when you are in doubt, to send a whipper-in to know the certainty of the matter."

Hounds ought not to be cast as long as they are able to hunt. It is a common, though not a very just idea, that a hunted fox never stops; but our author informs us that he has known them

stop even in wheel-ruts in the middle of a down, and get up in the middle of the hounds. The greatest danger of losing a fox is at the first finding him, and when he is sinking; at both which times he frequently will run short, and the eagerness of the hounds will frequently carry them beyond the scent. When a fox is first found, every one ought to keep behind the hounds till they are well settled to the scent; and when the hounds are catching him, our author wishes them to be as silent as possible; and likewise to eat him eagerly after he is caught. In some places they have a method of *trecing* him; that is, throwing him across the branch of a tree, and suffering the hounds to bay at him for some minutes before he is thrown among them; the intention of which is to make them more eager, and to let in the tail-hounds; during this interval also they recover their wind, and are apt to eat him more readily. Our author, however, advises not to keep him too long, as he supposes that the hounds have not any appetite to eat him longer than while they are angry with him.

2. *Under ground.* In case a fox does so far escape as to earth, countrymen must be got together with shovels, spades, mattocks, pickaxes, &c. to dig him out, if they think the earth not too great. They make their earths as near as they can in ground that is hard to dig, as in clay, stony ground, or amongst the roots of trees; and their earths have commonly but one hole, and that is straight a long way in before you come at their couch. Sometimes craftily they take possession of a badger's old burrow, which hath a variety of chambers, holes, and angles.

Now to facilitate this way of hunting the fox, the huntsman must be provided with one or two terriers to put into the earth after him, that is, to fix him into an angle; for the earth often consists of many angles: the use of the terrier is to know where he lies; for as soon as he finds him, he continues baying or barking, so that which way the noise is heard that way dig to him. Your terriers must be garnished with bells hung in collars, to make the fox bolt the sooner; besides, the collars will be some small defence to the terriers.

The instruments to dig withal are these: a sharp-pointed spade, which serves to begin the trench where the ground is hardest and broader tools will not so well enter; the round hollowed spade, which is useful to dig among roots, having very sharp edges; the broad flat spade to dig likewise, when the trench has been pretty well opened, and the ground softer; mattocks and pickaxes to dig in hard ground, where a spade will do but little service; the coal-rake to cleanse the hole, and to keep it from stopping up; clamps, wherewith you may take either fox or badger out alive to make sport with afterwards. And it would be very convenient to have a pail of water to refresh your terriers with, after they are come out of the earth to take breath.

Hare-HUNTING. As, of all chaces, the hare makes the greatest pastime, so it gives no little pleasure to see the craft of this small animal for her self-preservation. If it be rainy, the hare usually takes to the high-ways; and if she come to the side of a young grove, or spring, she seldom enters, but squats down till the hounds have over-shot her; and then she will return the very way she came, for fear of the wet and dew that hangs on the boughs. In this case, the huntsman ought to stay an hundred paces before he comes to the wood-side, by which means he will perceive whether she return as aforesaid; which if she do, he must halloo in his hounds, and call them back; and that presently, that the hounds may not think it the counter she came first.

The next thing that is to be observed, is the place where the hare sits, and upon what wind she makes her form, either upon the north or south wind: she will not willingly run into the wind, but run upon a side, or down the wind; but if she form in the water, it is a sign she is sick and mealed: if you hunt

such a one, have a special regard all the day to the brook-sides; for there, and near plashe, she will make all her crossings, doublings, &c.

Some hares have been so crafty, that as soon as they have heard the sound of a horn, they would instantly start out of their form, though it was at the distance of a quarter of a mile, and go and swim in some pool, and rest upon some rush-bed in the midst of it, and would not stir from thence till they have heard the sound of the horn again, and then have started out again, swimming to land, and have stood up before the hounds four hours before they could kill them, swimming and using all subtleties and crossings in the water. Nay, such is the natural craft and subtlety of a hare, that sometimes after she has been hunted three hours, she will start a fresh hare, and squat in the same form. Others having been hunted a considerable time, will creep under the door of a sheep-cot, and hide themselves among the sheep; or, when they have been hard hunted, will run in among a flock of sheep, and will by no means be gotten out from among them till the hounds are coupled up, and the sheep driven into their pens. Some of them (and that seems somewhat strange) will take the ground like a coney, and that is called *going to the vault*. Some hares will go up one side of the hedge and come down the other, the thickness of the hedge being the only distance between the courses. A hare that has been hard hunted, has got upon a quickset hedge, and run a good way upon the top thereof, and then leapt off upon the ground. And they will frequently betake themselves to furze bushes, and will leap from one to the other, whereby the hounds are frequently at fault.

Having found where a hare hath relieved in some pasture or corn-field, you must then consider the season of the year, and what weather it is: for if it be in the spring-time or summer, a hare will not then sit in bushes, because they are frequently infested with pismires, snakes, and adders; but will sit in corn-fields, and open places. In the winter-time, they sit near towns and villages, in tufts of thorns and brambles, especially when the wind is northerly or southerly. According to the season and nature of the place where the hare is accustomed to sit, there beat with your hounds, and start her; which is much better sport than trailing of her from her relief to her form.

After the hare has been started and is on foot, then step in where you saw her pass, and halloo in your hounds, until they have all undertaken it and go on with it in full cry: then reach to them with your horn, following fair and softly at first, making not too much noise either with horn or voice; for at the first, hounds are apt to overshoot the chace through too much heat. But when they have run the space of an hour, and you see the hounds are well in with it, and stick well upon it, then you may come in nearer with the hounds, because by that time their heat will be cooled, and they will hunt more soberly. But above all things, mark the first doubling, which must be your direction for the whole day; for all the doublings that she shall make afterwards will be like the former; and according to the policies that you shall see her use, and the place where you hunt, you must make your compasses great or little, long or short, to help the defaults, always seeking the moistest and most commodious places for the hounds to scent in.

Lastly: Those who delight in hunting the hare must rise early, lest they be deprived of the scent of her foot-steps.

Stag-HUNTING. Gesner, speaking of stag-hunting, observes, that this wild, deceitful, and subtle beast frequently deceives its hunter by windings and turnings. Wherefore the prudent hunter must train his dogs with words of art, that he may be able to set them on and take them off again at pleasure.

First of all, he should encompass the beast in her own layer, and so unharbour her in the view of the dogs, that so they may never lose her slot or footing. Neither must he set upon every

one, either of the herd or those that wander solitary alone, or a little one; but partly by sight, and partly by their footing and fumets, make a judgment of the game, and also observe the largeness of his layer.

The huntsman, having made these discoveries in order to the chace, takes off the couplings of the dogs; and some on horse-back, others on foot, follow the cry, with the greatest art, observation, and speed; remembering and intercepting him in his subtle turnings and headings; with all agility leaping hedges, gates, pales, ditches; neither fearing thorns, down hills, nor woods, but mounting a fresh horse if the first tire. Follow the largest head of the whole herd, which must be singled out of the chace; which the dogs perceiving, must follow; not following any other. The dogs are animated to the sport by the winding of horns, and the voices of the huntsmen. But sometimes the crafty beast sends forth his little squire to be sacrificed to the dogs and hunters, instead of himself, lying close the mean time. In this case, the huntsman must sound a retreat, break off the dogs, and take them in, that is, leam them again, until they be brought to the fairer game; which riseth with fear, yet still striveth by flight, until he be wearied and breathless. The nobles call the beast *a wise hart*, who, to avoid all his enemies, runneth into the greatest herds, and so brings a cloud of error on the dogs, to obstruct their farther pursuit; sometimes also bearing some of the herd into his footings, that so he may the more easily escape by amusing the dogs. Afterwards he betakes himself to his heels again, still running with the wind, not only for the sake of refreshment, but also because by that means he can the more easily hear the voice of his pursuers whether they be far from him or near to him. But at last being again discovered by the hunters and sagacious scent of the dogs, he flies into the herds of cattle, as cows, sheep, &c. leaping on a cow or ox, laying the fore-parts of his body thereon, that so touching the earth only with his hinder feet, he may leave a very small or no scent at all behind for the hounds to discern. But their usual manner is, when they see themselves hard beset and every way intercepted, to make force at their enemy with their horns, who first comes upon him, unless they be prevented by spear or sword. When the beast is slain, the huntsman with his horn windeth the fall of the beast; and then the whole company comes up, blowing their horns in triumph for such a conquest; among whom, the skilfullest opens the beast, and rewards the hounds with what properly belongs to them, for their future encouragement; for which purpose the huntsmen dip bread in the streaming blood of the beast to give to the hounds.

It is very dangerous to go in to a hart at bay; of which there are two sorts, one on land and the other in water. Now, if the hart be in a deep water, where you cannot well come at him, then couple up your dogs: for should they continue long in the water, it would endanger their furbating or foundering. In this case, get a boat, and swim to him, with dagger drawn, or else with a rope that has a noose, and throw it over his horns: for if the water be so deep that the hart swims, there is no danger in approaching him; otherwise you must be very cautious.

As to the land bay, if a hart be burnished, then you must consider the place; for if it be in a plain and open place, where there is no wood nor covert, it is dangerous and difficult to come in to him; but if he be on a hedge-side, or in a thicket, then, while the hart is staring on the hounds, you may come softly and covertly behind him, and cut his throat. If you miss your aim, and the hart turn head upon you, then take refuge at some tree; and when the hart is at bay, couple up your hounds; and when you see the hart turn head to fly, gallop in roundly to him, and kill him with your sword.

The first ceremony, when the huntsman comes in to the death of a deer, is to cry "*ware haunch!*" that the hounds may

not break in to the deer; which being done, the next is the cutting his throat, and there blooding the youngest hounds, that they may the better love a deer, and learn to leap at his throat: then the mort having been blown, and all the company come in, the best person who hath not taken say before, is to take up the knife that the keeper or huntsman is to lay across the belly of the deer, some holding by the fore-legs, and the keeper or huntsman drawing down the pizzle, the person who takes say, is to draw the edge of the knife leisurely along the middle of the belly, beginning near the brisket, and drawing a little upon it, enough in the length and depth to discover how fat the deer is; then he that is to break up the deer, first flits the skin from the cutting of the throat downwards, making the arber, that so the ordure may not break forth, and then he paunches him, rewarding the hounds with it.

In the next place, he is to present the same person who took say, with a drawn hanger, to cut off the head of the deer. Which being done, and the hounds rewarded, the concluding ceremony is, if it be a stag, to blow a triple mort; and if a buck, a double one; and then all who have horns, blow a recheat in concert, and immediately a general whoop, whoop.

Otter-HUNTING is performed with dogs, and also with a sort of instruments called *otter-spears*; with which when they find themselves wounded, they make to land, and fight with the dogs, and that most furiously. There is indeed much craft to be used in hunting them; but they may be caught in snares under water, and by river-sides: but great care must be taken, for they bite sorely and venomously; and if they happen to remain long in the snare, they will not fail to get themselves free by their teeth.

In hunting them, one man must be on one side of the river, and another on the other, both beating the banks with dogs; and the beast not being able to endure the water long, you will soon discover if there be an otter or not in that quarter; for he must come out to make his spraints, and in the night sometimes to feed on grass and herbs.

If any of the hounds find out an otter, then view the soft grounds and moist places, to find out which way he bent his head: if you cannot discover this by the marks, you may partly perceive it by the spraints; and then follow the hounds, and lodge him as a hart or deer. But if you do not find him quickly, you may imagine he is gone to couch somewhere farther off from the river; for sometimes they will go to feed a considerable way from the place of their rest, choosing rather to go up the river than down it. The persons that go a-hunting otters, must carry their spears, to watch his vents, that being the chief advantage; and if they perceive him swimming under water, they must endeavour to strike him with their spears, and if they miss, must pursue him with the hounds; which, if they be good and perfectly entered, will go chanting and trailing along by the river-side, and will beat every root of a tree, and oser-bed, and tuft of bulrushes; nay, they will sometimes take water, and bait the beast, like a spaniel, by which means he will hardly escape.

Roe-buck HUNTING is performed in various ways, but most easily in the woods. When these animals are chased, they usually run against the wind, because the coolness of the air refreshes them in their course; therefore the huntsmen place their dogs with the wind: they usually, when hunted, first take a large ring, and afterwards hunt the hounds. They are also often taken by counterfeiting their voice, which a skilful huntsman knows how to do by means of a leaf in his mouth. When they are hunted, they turn much and often, and come back upon the dogs directly; and when they can no longer endure, they take foil, as the hart does, and will hang by a bough in such a manner, that nothing of them shall appear above the water but

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their snout, and they will suffer the dogs to come just upon them before they will stir.

The venison of a roe-buck is never out of season, being never fat, and therefore they are hunted at any time; only that some favour ought to be shown the doe while she is big with fawn, and afterwards till her fawn is able to shift for himself; but some roe does have been killed with five fawns in their bellies.

He is not called, by skilful hunters, a *great* roe-buck, but a *fair* roe-buck; the herd of them is called a *bevy*: and if he hath not bevy-grease upon his tail, when he is broken up, he is more fit to be dog's meat than man's meat. The hounds must be rewarded with the bowels, the blood, and feet slit asunder, and boiled all together; this is more properly called a *dose* than a *reward*.

HUNTINGDON, the county town of Huntingdonshire, with a market on Saturday. It is seated on a rising ascent, on the river Ouse, over which is a handsome stone bridge, which leads to Godmanchester. It was once a large place, having no less than fifteen churches, which are now reduced to two; and sends two members to parliament. Huntingdon was the birth-place of Oliver Cromwell. It is 16 miles W. by N. of Cambridge, and 65 N. by W. of London. W. lon. o. 25. N. lat. 52 17.

HUNTINGDONSHIRE, a county of England, bounded on the W. and N. W. by Northamptonshire, on the N. E. the E. and S. E. by Cambridgeshire, and on the S. W. by Bedfordshire. It extends 25 miles from N. to S. and about 20 from E. to W. in its broadest part. The principal rivers are the Ouse and Nen. The borders of the Ouse, which flows across the S. E. part, consist of fertile and beautiful meadows. The middle and western parts are finely varied in their surface, fertile in corn, and sprinkled with woods. The whole upland part was, in ancient times, a forest, peculiarly adapted for hunting, whence the name of the county took its rise. The N. E. part consists of fens, which join those of Ely. They are drained, so as to afford rich pasturage for cattle, and even large crops of corn. In the midst of them are some shallow pools, abounding with fish. The largest of these is a lake of considerable size, called Whittlesea Mere. The air is good, except in the fenny parts, which are agueish. Its chief commodities are corn, malt, and cheese; and they fatten abundance of cattle. It sends four members to parliament; and the high sheriff, who is chosen alternately from Cambridgeshire and Huntingdonshire, is sheriff of both counties at the same time.

HUNTSPIL, a small town in Somersetshire, seated at the mouth of the river Parret, five miles N. of Bridgewater, and 143 W. by S. of London. W. lon. 3. 12. N. lat. 51. 11.

HU-QUANG, a province of the kingdom of China, in Asia, which has a great river called *Yang*, and *Tsechiang*, which runs across it from east to west. It is divided into the north and south parts, the former of which contains eight cities of the first rank, and sixty of the second and third; and the latter, seven of the first rank, and five of the second and third. It is a flat, open country, watered every-where with brooks, lakes, and rivers, in which there are great numbers of fish. Here is plenty of wild-fowls; the fields nourish cattle without number, and the soil produces corn, and various kinds of fruits. There is gold found in the sands of the rivers; and in the mines they have iron, tin, &c. In short, there is such a variety of all sorts of commodities, that it is called *the magazine of the empire*.

HURA, in botany; a genus of the monadelphia order, belonging to the monœcia class of plants; and in the natural method ranking under the 38th order, *Tricocœæ*. The amentum of the male is imbricated, the perianthium truncated: there is no corolla; the filaments are cylindrical, peltated on top, and surrounded with numerous or double antheræ. The female has

neither calyx nor corolla; the style is funnel-shaped; the stigma cleft in twelve parts; the capsule is twelve-celled, with a single seed in each cell. There is but one species, *viz.* the crepitans, a native of the West Indies. It rises with a soft ligneous stem to the height of 24 feet, dividing into many branches, which abound with a milky juice, and have scars on their bark where the leaves have fallen off. The male flowers come out from between the leaves upon foot-stalks three inches long; and are formed into a close spike or column, lying over each other like the scales of fish. The female flowers are situated at a distance from them; and have a long funnel-shaped tube spreading at the top, where it is cut into 12 reflected parts. After the flower, the germen swells, and becomes a round compressed ligneous capsule, having 12 deep furrows, each being a distinct cell, containing one large round compressed seed. When the pods are ripe, they burst with violence, and throw out their seeds to a considerable distance. It is propagated by seeds raised on a hot-bed; and the plants must be constantly kept in a stove. The kernels are said to be purgative, and sometimes emetic.

HURDLE, is the name of a kind of sledge used to draw traitors to the place of execution.

HURDLES, in fortification, are made of twigs of willows or osiers interwoven close together, sustained by long stakes. They are made in the figure of a long square, the length being five or six feet, and the breadth three and an half. The closer they are wattled together, the better. They serve to render the batteries firm, or to consolidate the passage over muddy ditches; or to cover traverses and lodgments for the defence of the workmen against fire-works or stones thrown against them.

The Romans had a kind of military execution for mutineers, called *putting to death under the hurdle*. The manner of it was this: The criminal was laid at his length in a shallow water, under an hurdle, upon which stones were heaped, and so pressed down till he was drowned.

HURDLES, in husbandry, certain frames made either of split timber, or of hazle-rods wattled together, to serve for gates in inclosures, or to make sheep-folds, &c.

HURDS, or **HORDS**, of flax or hemp; the coarser parts separated in the dressings from the tear, or fine stuff. See **FLAX**.

HURDWAR, a town of the province of Delhi, where the Ganges first enters the plains of Hindoostan. It is 117 miles N. by E. of the city of Delhi. E. lon. 78. 15. N. lat. 29. 35.

HURL-BONE, in a horse, a bone near the middle of the buttock, falsely supposed to go out of its sockets with a hurt or strain.

HURLERS, a number of large stones, set in a kind of square figure, near St. Clare in Cornwall, so called from an odd opinion held by the common people, that they are so many men petrified, or changed into stones, for profaning the sabbath-day by hurling the ball, an exercise for which the people of that country have been always famous. The hurlers are oblong, rude, and unhewed. Many authors suppose them to have been trophies erected in memory of some battle; others take them for boundaries to distinguish lands. Lastly, others, with more probability, hold them to have been sepulchral monuments.

HURLY-BURLY, in vulgar language, denotes confusion or tumult, and is said to owe its origin to two neighbouring families, Hurleigh and Burleigh, which filled their part of the kingdom with contest and violence.

HURON, a lake of N. America, which lies between 80° and 85° W. lon. and 42° and 46° N. lat. With lake Michigan, which lies to the W. it has a communication by the straits of Michillimackinac; with the lake Superior to the N. E. by

the straits of St. Mary; and with lake Erie to the S. by the straits of Detroit. Its shape is nearly triangular, and its circumference about 1000 miles. The Chipeway Indians live scattered around this lake; and on its banks are found amazing quantities of sand cherries. See **MANATAULIN** and **THUNDER BAY**.

HURRICANE, a general name for any violent storm of wind; but which is commonly applied to those storms which happen in the warmer climates, and which greatly exceed the most violent storms known in this country. Dr. Mosely, in his Treatise on Tropical Diseases, observes, that the ruin and desolation accompanying a hurricane can scarcely be described. Like fire, its resistless force consumes every thing in its track, in the most terrible and rapid manner. It is generally preceded by an awful stillness of the elements, and a closeness and mistiness in the atmosphere, which makes the sun appear red, and the stars larger. But a dreadful reverse succeeding, the sky is suddenly overcast and wild; the sea rises at once from a profound calm into mountains; the wind rages and roars like the noise of cannon; the rain descends in a deluge; a dismal obscurity envelops the earth with darkness; and the superior regions appear rent with lightning and thunder. The earth on these occasions often does and always seems to tremble, whilst terror and consternation distract all nature: birds are carried from the woods into the ocean; and those whose element is the sea, seek for refuge on land; the frightened animals in the field assemble together, and are almost suffocated by the impetuosity of the wind in searching for shelter; which, when found, serves them only for destruction. The roofs of houses are carried to vast distances from their walls, which are beat to the ground, burying their inhabitants under them. Large trees are torn up by the roots, and huge branches shivered off, and driven through the air in every direction, with immense velocity. Every tree and shrub that withstands the shock, is stripped of its boughs and foliage. Plants and grass are laid flat on the earth. Luxuriant spring is changed in a moment to dreary winter. This direful tragedy ended, when it happens in a town, the devastation is surveyed with accumulated horror: the harbour is covered with wrecks of boats and vessels; and the shore has not a vestige of its former state remaining. Mounds of rubbish and rafters in one place, heaps of earth and trunks of trees in another, deep gullies from torrents of water, and the dead and dying bodies of men, women, and children, half buried, and scattered about, where streets but a few hours before were, present the miserable survivors with a shocking conclusion of a spectacle to be followed by famine, and, when accompanied by an earthquake, by mortal diseases.

Philosophers are now inclined to attribute these terrible phenomena to electricity, though the manner in which it acts in this case is by no means known. It seems probable, indeed, that not only hurricanes, but even the most gentle gales of wind, are produced by the action of the electric fluid. See the articles **ELECTRICITY**, **WIND**, **WHIRLWIND**, &c.

HURST, **HYRST**, or **HERST**, are derived from the Saxon *byrst*, i. e. a wood, or grove of trees. There are many places in Kent, Suffex, and Hampshire, which begin and end with this syllable; and the reason may be, because the great wood called *Andrefswald* extended through those countries.

HURST-Castle, a castle in Hampshire, not far from Lymington. It is seated on the extreme point of a neck of land, which shoots into the sea toward the Isle of Wight, from which it is distant two miles. In this castle Charles I. was confined previously to his being brought to trial.

H U S B A N D R Y,

IN the extensive signification of the word, implies the art of preparing, cultivating and improving the ground by manures or other means, so as to render it the most fruitful and productive in the easiest manner and at the least expence: but in the more common acceptation of the term, it signifies the business or employment of the farmer; consequently, comprehends the various processes and operations which are necessary in the management of the different articles and products of the farm.

Under this head we shall therefore consider whatever relates to agriculture or the modes of improving the earth, and also the management of the several articles which are produced by it, and which are objects of the attention of the farmer.

I N T R O D U C T I O N.

HUSBANDRY may, with the greatest propriety, be placed at the head of human arts, having a great advantage over all others both in regard to its antiquity and usefulness. It would not, however, be of much utility to trace its origin in the very early ages, or to mark its progressive steps in those which immediately succeeded them. It is here sufficient to observe that it was cultivated with great assiduity by the Chaldeans, the Egyptians, the Phenicians and the Athenians.

We also find that among the ancient Romans husbandry was considered so very honourable an employment, that, in the earliest periods of the republic, the highest praise that could be conferred upon a person was to say of him, that he had well cultivated his spot of ground.

Indeed the most illustrious senators of the empire, in the intervals of public business, applied themselves to the cultivation of this highly useful art.

It also received considerable improvements from their writings. Cato the Censor, Varro, Virgil, Columella and Palladius composed useful works on this important science. But from this period to that of the reign of Constantine Paganatus, husbandry continued in a declining state: that wise emperor, however, caused a large collection of the most useful precepts relating to the art to be extracted from the best writers, and published them under the title of Geoponics. It has even been asserted, that he made this collection with his own hand; which seems not improbable, as it is well known, that after he had conquered the Saracens and the Arabians, he not only practised and encouraged, but studied the arts of peace, fixing his principal attention on this science, as their surest basis. However, after the decease of Constantine, the increasing attention of the people to commerce, and the ignorance and gross superstition of the ages which succeeded, rendered agriculture an almost neglected science. We find no vestiges of any thing tolerably written on this department of knowledge. No new attempts were made to revive or improve it until the year 1478, when the excellent performance of Crescenzo a Florentine roused the slumbering attention of his countrymen, several of whom soon followed his example.

In respect to the state and progress of husbandry in our own country previous to the fourteenth century, we are very imperfectly informed. That it was pretty generally practised, particularly in the eastern, midland, and southern parts of the kingdom, is certain; but of the mode, and the success, we are left almost wholly ignorant. About the close of the fifteenth century, however, it seems to have been cultivated as a science, and received very considerable additions. For at this period

Fitzherbert, Judge of the Common-Pleas, distinguished himself in the practical parts of the art. He appears to have been the first of our countrymen who studied the nature of soils, and the laws of vegetation, with philosophical attention. He published two works on the subject; the first, entitled "*The Book of Husbandry*," in 1534; the second, called "*The Book of Surveying and Improvements*," in 1539. These treatises, being composed at a period when philosophy and science were but just emerging from that gloom in which they had long been involved, were doubtless in many respects erroneous; but they contained the principles of true knowledge, and revived the study and love of an art, the advantages of which were so very obvious. They therefore soon raised a spirit of emulation in the nation, and many works of the same kind successively appeared.

In France, about the year 1600, considerable efforts were made to revive the arts of husbandry, as appears from several important works, such as *Les Moyens de devenir Riche*; and the *Cosmopolite*, by Bernard de Piliilly, an indigent porter.

About the same period, also, the practice of husbandry became more prevalent among this people and the Flemings than that of publishing their improvements on the subject. Their intention evidently was to carry on a private lucrative employment, without instructing their neighbours. Whoever therefore was desirous of knowing their mode of husbandry was under the necessity of visiting that country, in order to make his remarks on their practice. Their principal attention seems to have been directed to keeping the lands clean and in fine tilth. This judicious principle at first led them to undertake the culture of only little farms, which they kept free from weeds, continually turning the ground, and manuring it properly. The soil by this means being brought to a proper degree of cleanliness, health, and richness, the more delicate grasses were attentively cultivated as the safest way of obtaining a certain profit upon a small estate, without the expence of keeping many horses and servants. The advantages of this plan were quickly perceived, and as quickly led to other improvements. The importance of the secret of this husbandry, however, consisted in letting farms on improvement. Of the discoveries of these people concerning the nature of manures, we are not well informed. It is certain, however, that they were the first among modern farmers who ploughed in green crops for the sake of fertilizing the soil; and who confined their sheep at night in large sheds, the floors of which were covered with sand or virgin earth, in order that it might be converted into good manure by the evacuations of these animals.

In England, the progress of improvement in husbandry was considerably retarded at this period by the civil wars. There were, however, several works produced, which tended to revive a taste for the neglected art of agriculture, and it is probable that even Cromwell himself gave encouragement to it.

Sir Hugh Platt, by his application to husbandry, and cultivating the acquaintance and correspondence of the lovers and patrons of agriculture and gardening, promoted in a considerable degree the improvement of the art. Perhaps no man brought so many new kinds of manure into use. This is evident from his account of compost and covered dung-hills, and his useful observations on the fertilizing qualities of salt, street-dirt, and the *fullage* of streets, clay, fuller's-earth, moorish earths, dung-hills made in layers, fern, hair, calcination of all vegetables, malt-dust, willow-tree earth, soap's ashes, urine, marle, &c.

The excellent observations and ingenious writings of the unfortunate Plattes, as well as those of Hartlib, contributed greatly to the improvement of agricultural knowledge. Indeed the period in which the latter flourished seems to have been an æra when husbandry in this country rose to great perfection, compared with that of former periods. This attention to improve the land was not however of long duration; for we find soon after this, that the improvement of husbandry depended almost solely on the common or unenlightened cultivator of the earth.

About this time Evelyn however inspired his countrymen with the desire of promoting the study of agriculture; and was supported by the valuable labours of the celebrated Jethro Tull. The former, by his excellent Treatises on earth and on planting, and the latter by shewing the superior advantages of the new or drill husbandry, did much to augment and advance the profession; and their united executions opened a new and extensive field of practical enquiry. Other valuable improvements have also been made since that period in English husbandry. Ireland, too, about the middle of the last century, began to extend and improve the art of husbandry. The valuable labours of Blythe seem to have awakened the attention of the people, and stimulated them to the cultivation of agriculture upon better and more rational principles. And the establishment of a society in Dublin, for the purpose of encouraging husbandry, sufficiently shews that considerable attention is now paid to the improvement of this useful art. Lately, indeed, the rapidity of its advancement in that kingdom would seem to have been nearly equal to that which it has made in this country.

Not only France, but many other nations, when peace had been restored by the treaty of Aix-la-Chapelle, turned their attention to the study of agriculture. It was even encouraged publicly by the king of France, and many of the great and rich inhabitants of that country laudably followed his example.

But the distress of that nation, in the war that succeeded, rendered the necessity of promoting this peaceful art still more evident. Different societies and academies were consequently established in different parts of the kingdom, and prize questions proposed, in order to extend and improve the knowledge of husbandry. And the practical observations contained in the writings of the Marquis de Tourbilly tended probably still more to forward the design.

In Switzerland too the same methods were pursued, in order to advance the knowledge of agriculture.

Considerable exertions were also made, about this period, to introduce approved systems of European husbandry into Russia. And for a considerable length of time agriculture has constituted a part of academical education in Sweden, Denmark and Germany; and the different States of Italy, though extremely enfeebled by luxury, have not been wholly inattentive to the art. Their progress has not, however, been rapid, or their improvements numerous.

The new husbandry has also, on several occasions, been applied to the fertile lands of Poland with great advantage by M. de Bieluski. Therefore Holland, probably alone, has exhibited an example of the neglect of husbandry; and now even there the utility of this art begins to be understood.

The fact is, however, that in our own country husbandry has received the greatest improvement. The practical exertions

of many of those who are engaged in this healthy employment have very considerably promoted the advancement of the art, by separating the useful from the visionary. The dissemination of the periodical labours of different provincial societies, which have within these few years been established in the kingdom, have also contributed largely to the same purpose. And the excellent writings of Young, Marshall, Kent, Mills, and a great many others equally valuable, have now created in the mind of the farmer an anxiety for improvement, and taught him the most convenient and economical means of applying new modes of cultivation to different branches of his art.

The utility and influence of so excellent an institution as that of the BOARD OF AGRICULTURE, must also be considerable in rendering improvements in husbandry more numerous, extensive, and important.

But, notwithstanding these different sources from which agriculture has been promoted, the art is still far from having attained that degree of perfection which might have been expected from the great length of time that it has been cultivated; the reason of which would seem to be, that it has been practised without much regard to scientific principles, consequently has derived few advantages from modern improvements in natural philosophy or chemistry. Vague and fortuitous experience has indeed contributed more to the present flourishing state of the art than any general principles deduced from the knowledge which we have lately acquired, either of the process of vegetation, or of the nature of soils. The skill thus fortuitously acquired must however necessarily be partial, and mostly local; even the very terms employed by those who most eminently possess it, are generally of a vague and uncertain signification. Thus, clay is frequently mistaken for marle, marle for chalk, and the first again for loam. The philosophical enquiries which have been made on this important subject have therefore not yet been sufficiently attended to by the practical farmer. Much useful information may however be derived from the researches of Monsieur Du Hamel, and still more from the well-directed experiments of Mr. Tillet. The labours of the illustrious Bergman also deserve considerable attention. Dr. Priestley by his ingenious experiments has likewise thrown new light on many parts of this subject. And the important Chemical Theory of Mr. Lavoisier has led to the explanation of many circumstances which before seemed inexplicable. Valuable discoveries have also been made by Mr. Senebier and Dr. Ingenhousz; but the fullest information on the subject would seem to be conveyed by the late enquiries of Mr. Hassenfraz.

It is evident, however, from the nature of the subject, that no solid progress can be made in the important art of husbandry, without an attentive application of the principles of chemistry. "Every farmer, says an excellent writer (the Earl of Dundonald), to a certain extent should be a chemist, so that he may be enabled to understand the nature and properties of the several substances in the management of which he is daily engaged; and that, in all his attempts to improve the soil, the success of his operations may no longer depend on guess-work, or on chance, but be regulated by a proper knowledge of the materials he may have to work with, how each may best be applied or acted upon, and what effects will ensue from their different combinations."

P A R T I.

THEORY OF HUSBANDRY.

IT may naturally be supposed, from the very remote period at which this art began to be exercised and attended to, that its theory should approach to a considerable state of perfection.

Such, however, has been the vague manner in which it has been cultivated, such the number and variety of facts which it embraces, and so difficult and tedious the experiments by which

they are to be ascertained, that the science is yet by no means capable of receiving a final arrangement.

It is indeed probably to the peculiar difficulties of the investigation, that the intimate connection of effects with their causes has not been so fully or so extensively traced in this as in some other subjects. In several other sciences, exposed to the united operations of many causes, the effects of each, singly and exclusively taken, may be particularly examined: the experimenter may work with the object constantly in his view; but the mysterious processes of vegetation take place in the dark, exposed to the various and indeterminable influences of the atmosphere, and require a considerable length of time for their completion. Hence the extreme difficulty of determining on what particular circumstance success or failure depends: the diversified experience of a great number of years can only afford rational foundation for a few conclusions. Therefore the industry and attentive experience of many ages must yet be required, in order to form any thing like a perfect theory of this extensively useful science.

SECT. I. *Of the constituent Principles of Soils.*

As a knowledge of the nature of the principles of soils is of the greatest importance to the farmer, and indeed forms the basis of agriculture, it will be necessary to begin by enquiring into their respective properties.

Land, when considered as the basis of different vegetable products, is commonly termed *soil*.

Soils are formed by different combinations of two or more of the primitive earths, viz. the *argillaceous*, the *calcareous*, the *siliceous*, and *magnesian*. Iron also, when it exists in the state of an oxyd calx or earth, frequently enters into the composition of soils.

Argillaceous matter. This forms a large portion of the surface soil of most countries, and is also found in the mineral strata to a very great depth. It is no where found pure, but always more or less mixed with the different earths, and with other materials, such as mineral, vegetable, and animal matters. This earth is the most retentive of moisture of any, by which means it becomes ductile and tenacious; but loses these properties by the action of fire, and is converted into brick.

Calcareous matter. This substance constitutes in many countries not merely the surface or soil, but also the under stratum to a considerable depth. Under this general title may be included chalk, marble, limestone, coral, shells, &c. The three first are frequently mixed with iron, and with different proportions of the simple earths; but are considered as calcareous when the proportion of that earth predominates. This matter is capable of absorbing and retaining moisture, though in considerably less degree than clay. When sufficiently acted upon by fire it becomes lime, and returns again to the state of chalk or calcareous matter on being exposed for some time to the atmosphere.

Siliceous matter. Extensive tracts of the surface of the earth in different countries are of this kind; and large masses of the under stratum also consist of the same substance: the former in the state of loose sand, and the latter in an indurated or solid state, denominated sand-stone or free-stone. It is the least retentive of moisture of all the different earths.

Magnesian earth. This earth is no where found in such quantities as to form a soil of itself; but it is contained in various proportions in different soils, and forms a component part of steatites or soap rock. It is to a certain degree retentive of moisture.

It may here be necessary to attend more fully to these substances, as constituting the different soils, which for our purpose may be considered as the following, viz. *clay, chalk, sand,*

gravel, loam, clayey loam, chalky loam, sandy loam, gravelly loam, ferruginous loam, boggy soil, and brathy soil.

Clay. This is of various colours, as white, grey, brownish-red, brownish black, yellow, and blue; it feels smooth and somewhat unctuous; if moist it adheres to the fingers, and when sufficiently so, becomes tough and ductile, as has been already observed. In its dry state it adheres more or less to the tongue; when thrown into water it gradually diffuses itself through it, and separates slowly from it. With acids it does not usually effervesce, unless a strong heat be applied, or it should contain some calcareous particles, or magnesia.

The blue, the red, and the white clays, if strong, are said to be unfavourable to vegetation; but the stony and looser sorts much less so. However, none of them are valuable until their texture be loosened by a mixture of other substances, by which means other agents in vegetation are admitted to operate upon them. The proportions of argill or *pure clay*, sand, and ferruginous matter, which are commonly contained in this substance, are extremely various. The first is, however, generally in a very large proportion to the other two. Soils of this kind must therefore obviously be retentive of humidity, in proportion to the quantity of the argillaceous or principal ingredient.

Chalk, when not very impure, is of a white colour, moderate hardness, and dusty surface, soils the fingers, adheres slightly to the tongue, does not harden on heating, but in a strong fire burns to lime, and loses very considerably of its weight. It effervesces, and almost entirely dissolves in acids; but the solution is not disturbed by ammoniac or caustic volatile alkali. It promotes putrefaction in substances to which it is applied.

A soil of this kind, when little mixed with other substances, is always unproductive. It therefore requires a due admixture of other earths, and a proper quantity of vegetable and animal matters, in order to render it fertile and productive.

Sand. This substance is generally met with in small loose particles or grains, of considerable hardness, which do not cohere with water or become soft by it. It is most commonly of the siliceous kind, and consequently insoluble in acids.

Gravel. The principal variation of this from the above substance is in the magnitude of the particles. Stones which are of a calcareous quality, when small and rounded in shape, are frequently comprehended under this appellation.

Soils which are principally constituted of these two substances are barren, and consequently require considerable labour and expence to improve or render them capable of producing good crops.

Loam. By this term is understood any soil which has a moderate degree of cohesion; that is, one which has less than clay and more than loose chalk. Some writers, however, give a different definition of it. The intelligent author of the Body of Agriculture calls it a clay mixed with sand; and by Doctor Hill it is said to be an earth composed of dissimilar particles, hard, stiff, dense, harsh, and rough to the touch, not easily ductile while moist, readily dissoluble in water, and composed of sand with a tough viscid clay.

Clayey loam is that kind of compound soil in which, besides being moderately cohesive, the argillaceous ingredient predominates. Its coherence is consequently greater than that of any other loam, but still less than that of pure clay. The other substance of which it is composed is a *coarse sand*, with or without a slight mixture of calcareous matter. By those who are engaged in cultivating the ground, this is commonly denominated *strong, stiff, cold, or heavy loam*, in proportion to the quantity of clay which it contains.

Chalky loam is a term which denotes a compound soil that is composed of clay, coarse sand, and chalk; but in which the

calcareous or chalky part considerably predominates. It is found to be less cohesive than clayey loams.

Sandy loam furnishes us with an example of that sort of loam or soil in which the sandy part is most abundant. It has less coherence than either of those which have been just mentioned. Sand partly coarse and partly fine constitutes from eighty to ninety parts out of each hundred of this kind of soil.

Gravelly loam varies from the above only in this, that it contains a larger proportion of the coarse sand, or pebbles. This, and the two which have been just described, are generally termed, by those employed in farming, *light* or *hungry* soils, especially when their depth is not considerable.

Ferruginous loam. This denotes a soil which is generally of a dark brown, or reddish colour, and is much harder than any of those which have been described above. It is formed of clay and the oxyds or calces of iron more or less intimately blended together. It is capable of being distinguished not only by its colour, but also by its superior weight. It is sometimes found to effervesce with acids, at other times not; but when it does, a considerable portion of the iron part may be separated by proper chemical processes.

Some, which have been called *vitriolic soils* have a near relation to this. These are generally of a blue colour, but when heated become of a red cast.

Boggy soil. This is a soil which is chiefly composed of the ligneous roots of decayed vegetables, mixed with earth generally of the argillaceous kind, with sand, and a coaly substance produced from decayed vegetable matter. There are two kinds of bogs, viz. the *black*, which contains a large proportion of clay and of roots more perfectly rotten and destroyed, with a mineral oil; and the *red*, in which the roots of the vegetables appear less perfectly decayed, but to constitute the principal part of the soil.

Heathy soil. This is that kind of soil in which there is a natural tendency to the production of heath.

Having thus briefly explained the nature of the constituent principles of various kinds of soil, we shall proceed to the consideration of the nature of the different substances which may be employed as manures.

SECT. II. *Of the Substances and Operations employed for improving Soils.*

By the term manure is understood any substance by means of which a soil is improved; and the improving a soil signifies the rendering it capable of producing corn, legumens, the most useful grasses, &c. Some operations in farming have also a similar tendency.

Those substances which have principally been employed as manures, are chalk, lime, clay, sand, marle, gypsum, ashes, stable-dung, mucks, farm-yard dung, pounded bones, sea-weeds, sweepings of ditches, old ditches, and such-like materials. The other kinds of manures or top-dressings, as they are used chiefly to promote the growth of vegetables, and not merely with a view to improve the soil, must be considered in a subsequent part of the Treatise.

With respect to the operations which have been made use of to improve soils, they may be reduced to the following, viz. fallowing, draining, paring and burning.

Clays. These substances have yet been but little employed for the purposes of improving the ground. It is however known, that a proper mixture of clay with other substances contributes to some important purposes: it keeps in the soils to which it is applied, the attenuated particles of animal, vegetable, and oily matters. The general qualities of these substances have been shewn above.

Chalk. We have already described the general properties of this substance. It is found to be a pretty durable manure when

applied to those soils with which it agrees; but has perhaps been used with too little discrimination by the practical farmer. Of the different kinds of chalk, that which is hard, dry, and firm is much the properest for burning into lime; but that which is fat and unctuous is more proper to be used in the crude state as a manure. Chalk, as being saturated with carbonic acid gas, or fixed air, is not by any means so powerful as lime in promoting the destruction of the texture of organic bodies; it has however a considerable action on such substances.

Sand. This substance may be usefully employed in the improvement of soils. It has been chiefly used for the purpose of loosening and rendering less compact such soils as were too firm and coherent. By this means lands have frequently been rendered fertile, and capable of producing good vegetables. The properties of sand have been considered in the preceding section.

Lime. This is a substance whose external characters and mode of production are very generally known. It differs from chalk and powdered limestone chiefly by the absence of carbonic acid gas or fixed air, which is expelled from these during their calcination. It eagerly re-absorbs this air from the atmosphere, and all other bodies with which it comes in contact, and which can furnish it; but it cannot unite with the air, unless it is previously moistened. One hundred parts of quick-lime absorb about twenty-eight of water. It is soluble in about seven hundred parts of this fluid. To regain its full portion of air from the atmosphere, it requires a considerable length of time, even a year or more, if not purposely spread out. When in a dry state it resists putrefaction; but with the assistance of moisture it resolves organic substances into a mucus very speedily. All lime is good as a manure, but that which is made from stone is said to be better than that from chalk.

Marle. Of this substance there are three sorts; *calcareous*, *argillaceous*, and *siliceous* or *sandy*. All these are mixtures of mild calx or chalk with clay, in such a manner as to fall to pieces, on being exposed to the atmosphere, more or less readily.

Calcareous marle. This is that kind which is most commonly understood by the term *marle* without addition. It is generally of a yellowish-white, or yellowish-grey colour; but rarely brown or lead-coloured. It is seldom found on the surface of land, but commonly a few feet under it, and on the sides of hills, or rivers that flow through calcareous countries, or under turf in bogs. It is frequently of a loose texture, sometimes moderately coherent; rarely of a stony hardness, but when in this state is called *stone-marle*. Sometimes of a compact, sometimes of a lamellar texture; often so thin as to be called *paper-marle*. It often abounds with shells, and then is called *shell-marle*; which is looked upon as the best sort. When in powder, it feels dry between the fingers; put in water, it quickly falls to pieces or powder, and does not form a viscid mass. It chips and moulders by exposure to the air and moisture, sooner or later, according to its hardness and the proportion of its ingredients: if heated, it does not form a brick, but lime. It effervesces with all acids. It consists of from thirty-three to eighty parts of mild calx, and from sixty-six to twenty of clay, in the hundred.

In order to find its composition, Mr. Kirwan gives the following directions: Pour a few ounces of weak but pure spirit of nitre or common salt into a Florence flask; place them in a scale, and let them be balanced; then reduce a few ounces of dry marle into powder, and let this powder be carefully and gradually thrown into the flask, until after repeated agitation no effervescence is any longer perceived: let the remainder of the powdered marle be then weighed, by which the quantity projected will be known: let the balance be then restored: the difference of weight between the quantity projected and that requisite to restore the balance will discover the weight of air lost during effervescence: if the loss amounts to thirteen in the hundred of

the quantity of marle projected, or from thirteen to thirty-two, the marle essayed is calcareous marle. This experiment is decisive, when we are assured by the external characters above mentioned, that the substance employed is marle of any kind; otherwise some sorts of the sparry iron-ore may be mistaken for marle.

Argillaceous marle. This kind of marle contains from sixty-eight to eighty parts in the hundred of clay, and consequently from thirty-two to twenty of aerated calx. Its colour is grey or brown, or reddish-brown, or yellowish, or blueish-grey. It feels more unctuous than the former, and adheres to the tongue: its hardness is generally much greater. In water it falls to pieces more slowly, and often into square pieces: it also moulders more slowly by exposure to the air and moisture, if of a loose consistence: it hardens when heated, and forms an imperfect brick. It effervesces with spirit of nitre or common salt, but frequently refuses to do so with vinegar. When dried and projected into spirit of nitre in a Florence flask, with the attentions above mentioned, it is found to lose from eight to ten parts in the hundred of its weight. The undissolved part, well washed, will, when properly heated, harden into a kind of brick.

Siliceous, or sandy marles. These are marles the clayey part of which contains an excess of sand: for, if treated with acids in the manner above mentioned, the residuum or clayey part will be found to contain above seventy-five parts in the hundred of sand; consequently chalk and sand are the predominant ingredients in them.

With regard to the colour of this marle, it is brownish-grey, or lead-coloured; generally friable and flakey, but sometimes forms very hard lumps. It does not readily fall to pieces in water. It chips and moulders by exposure to the air and moisture, but slowly. It effervesces with acids; but the residuum after solution will not form a brick, as in the above kind.

Limestone-gravel. This is found to be a marle mixed with large lumps of limestone. The marle may be either calcareous or argillaceous; but it is most commonly of the former kind; and the sandy part is also generally calcareous.

Gypsum. This substance is a compound of calcareous earth and vitriolic acid, and forms a distinct species of the calcareous genus of fossils; of which species there are many different families. The general characters of this species are the following: It is soluble in about five hundred times its weight of water, in the temperature of sixty degrees; and is precipitated therefrom by all mild alkalis, and also by caustic fixed, but not by ammoniac or caustic volatile, alkali; does not effervesce with acids, if the gypsum be pure; but some families of this species, being contaminated with mild calx, slightly effervesce; is insoluble, or nearly so, in the nitrous acid, in the usual temperature of the atmosphere, having a *specific gravity* reaching from 216 to 231; and a degree of *hardness* such as to admit being scraped by the nail. When heated nearly to redness, it calcines; and if then it be slightly sprinkled with water, it again concretes and hardens. It promotes putrefaction in a very high degree.

It will here only be necessary to describe one of the families of this species; namely, that which has been most advantageously employed as a manure. It is called *fibrous gypsum*; and its colours are grey, yellowish or reddish, or silvery white, or light red, or brownish-yellow, or striped with one or more of these dark colours. It is composed of fibres or stræ either straight or curved, parallel or converging to a common centre, sometimes thick, sometimes fine and subtile, adhering to each other, and very brittle: its hardness such as to admit being scraped with the nail: commonly semitransparent; in some, often in a very considerable degree.

Ashes. Substances of this kind have frequently been employed as manures. Sifted coal-ashes, those of peat and white turf-ashes, have been found the most useful; red turf-ashes have appeared to be not only useless, but generally hurtful. Wood-ashes

have however been employed advantageously in many cases: they contain, as Mr. Bergman asserts, the four primitive earths, but according to Achard, chiefly calcareous earths; and according to D'Arcet, calcareous and magnesian earth. They also contain some proportion of phosphorated selenite, or calcareous earth united to the phosphoric acid; and almost all of them contain also a small and variable proportion of common salt, Glauber's salt, and terrene salts, which, when in a small quantity, all accelerate putrefaction; also small bits of charcoal are to be met with among them.

Charcoal. This is a substance very well known; and which has frequently and successfully been used as a manure. The most convenient mode of applying it seems to be in the form of dust.

Soap-boiler's waste. This has been found to form an excellent manure for some soils: it contains, as appears from the excellent analysis of Mr. Ruckert, fifty-seven parts in the hundred of mild calx, eleven of magnesia, six of argill, and twenty-one of silic.

Stable-dung. Manure of this kind is used either fresh or putrefied; the first is called *long*, the other *short dung*; it abounds in animal matter, easily runs into putrefaction, and when putrefied serves as a leaven to hasten the decay of other dead vegetable substances: its fermentation is promoted by frequent agitation and exposure to the air: it should however be covered, to prevent water from carrying off most of its important ingredients; or at least the water that imbibes them should not be permitted to be dissipated.

Farm-yard dung. This manure consists of various vegetables, such as straw, weeds, leaves, fern, &c. impregnated with animal matter; it ferments more slowly than the former; should be piled in heaps, and stirred from time to time. Fern putrefies very slowly. The water that issues from it should be preserved with great care.

On the subject of stable and farmyard dung the Earl of Donald has many judicious observations. When animal dung and vegetable are mixed together, such as horse-dung, urine, straw and hay, a degree of heat is generated and disengaged by the absorption of oxygen or vital air, and water is decomposed. As the process of putrefaction proceeds, ammoniac or volatile alkali is formed; and, in its tendency to escape from the heap, combines with such parts of the vegetables and matters of the dung as had advanced to the oxygenated state; forming therewith a saponaceous saline matter. The formation of this saponaceous matter in the greatest possible quantity will be promoted by mixing and covering the dung with a due proportion of earth. Hence the dung of hot-beds is the most completely rotted, and most assimilated to this saponaceous saline state, in which state it is more capable of promoting vegetation than dung that has not arrived to an equally advanced state of putrefaction.

This ingenious writer also suggests it as probable, that the particular advantages arising from the use of long dung or litter in some cases depend on the atmospheric air contained in the intervals of the soil made by the straw or litter suffering a degree of separation or decomposition in its imprisoned state, by which means the pure air or oxygen may combine with the straw and inflammable or vegetable matter in the soil; while the azote or phlogisticated air will contribute to the growth of the plants. This explanation of the beneficial effects arising to vegetation by a stagnated air, will also, he thinks, account for the benefit which plants of a certain construction of stem and leaf, and which very much overshadow and cover the ground, ultimately receive by preventing a free circulation of air.

In the application of long and short kinds of dung, preference should in general be given to such as has most completely undergone the putrefactive process. Dung and urine newly

voided are not in a putrescent state; they are only advancing towards putridity, or in a very small degree putrid. The further putrescency of these substances is promoted by a due degree of heat and moisture, particularly when aided by certain saline matters. The most powerful of these are the neutral salts, containing the sulphuric or vitriolic acid, such as vitriolated tar-

tar, Glauber's salt, Epsom salt, and gypsum. These neutral salts, on being mixed with putrescent substances, are changed into the state of hepar: hence the very offensive smell arising from dung and other matters containing such salts. The best means of forming dunghills &c. will be mentioned in the practical part of the Treatise.

Table of the Constituent Principles of Manures, as given by Mr. Kirwan.

105 lb.	Heavy Inflam. Air. Cub. Inc.	Fixed Air. Cub. Inc.	Water. lb.	Coal. lb.	Calx and Magnesia. lb.	Argill. lb.	Silex. lb.	Vol. Alk. lb.	Fixed Salts. lb.
Fresh cow-dung -	—	—	—	3,75	1, 2	0,15	2, 4	—	0, 6
Fresh horse-dung -	—	—	88	10,2	1, 5	0,5	3	—	0,21
Sheeps dung -	—	—	—	25,0	9,28 Calx. 1, Magn.	3	29	—	0,72
Rotten cow-dung -	1360	120	81	10	3.	0, 6	5	0.65	Gyps. 0, 9
Earth resulting from rotten horse-dung -	1.64	1.	Water and oil 38,15	18,75	6, 2	1, 5	23,43		F. Salts, 0,24
Soapboilers waste -	—	—	—	—	57 Calx. 11 Magn.	6,	21,		

It is evident therefore that manures should not be applied indiscriminately, but according to circumstances, which will be shewn in its proper place.

Pounded bones. These also form a manure much used in the neighbourhood of great towns. They gradually deposit their oily part, which contains a large proportion of animal coal, which is extricated by putrefaction, and phosphorated calx. Hence bone-ash is also found to be serviceable.

Sea-weed. These weeds, particularly if mixed with earth, soon putrefy, and make manure of an excellent quality.

Sweepings of ditches. These abound with putrid matter from decayed vegetables, and consequently form a manure which is very useful.

Old ditches. These, from their exposing a large surface to vegetation, contain, when destroyed, a quantity of decayed vegetables, which putrefy and make a good manure; but both in this and the former case, it may be proper to distinguish of what soil they are composed, for reasons that will hereafter be mentioned.

Draining. This is an operation which is frequently essentially necessary, and which is well known to the practical farmer. It is an extensively useful process in moist and wet countries, and must generally be accomplished before the land can be cultivated or improved. See DRAINS.

Under-draining seems at present to be deservedly gaining the attention and becoming the practice of intelligent farmers. This is a method that unquestionably prevents the waste of much useful land, that more certainly and more completely fulfils the intention with which it is made, that is of much longer duration, and, what is still a greater recommendation, that is finally much less expensive. The ingenious author just quoted has remarked, that a method has lately been discovered and practised with success, by which, in many places, the upper stratum is drained by the assistance of the mineral strata which are beneath it, through which the water is made to drop, and thus taken from the surface. By these means, and by open drains, lands are principally to be rendered dry: there are, however, a few other methods of a different kind, but which must be inserted in another part of this Treatise.

Fallowing. This is one of the principal operations by which exhausted lands are restored to fertility; its use seems to Mr. Kirwan to consist in exposing the roots of vegetables to decay, whereby food for a fresh growth is prepared; the atmosphere also deposits fixed air and carbonaceous substance on earth which has been long exposed to its influence.

Paring and burning. By these means the roots of vegetables are reduced to coal and ashes; and thus are prepared both a stimulant and nutriment for plants. It is a comburatory dissipating process, by which nineteen parts out of twenty of the vegetable matter, the only substance the fire can act upon, is dissipated and carried off by the air. From this process having been injudiciously employed, and carried to such an excess, by the frequency of its repetition, as to destroy almost the whole of the vegetable matter contained in lands to which it has been applied, it is now become much less frequent in this country; and in Ireland it is said to be entirely prohibited. In a subsequent part of the work we shall speak of the manner in which it may be advantageously employed, and of the kinds of land in which it is most likely to be useful.

SECT. III. *Of the Food of Plants.*

In the two preceding sections we have considered the principles and the nature of the different soils known in agriculture, and described the different substances or manures, the general utility of which has been ascertained by long experience. We shall now therefore enquire which of these manures are most advantageously applicable to each of those particular soils, and what are the causes to which their beneficial effects in each particular instance are to be ascribed.

But in order to proceed with method in this enquiry, it must be observed, that the general effect expected from the application of manure is fertility; that is, the most copious production of corn, grasses, and other herbage; and that since fertility is itself the result of the due administration of the food of those vegetables, it must first be seen what that food is, and of what ingredients a soil ought to be composed, in order to contain or administer it; after which we shall endeavour to shew by what manures each particular sort of soil is brought into a fertile

state, which is the advantage to be expected from them, and how in each particular instance they contribute to the due administration of the vegetable food, which is the cause by which their beneficial effect is produced.

In order to discover the food of plants, especially of those which form the object of our present enquiry, it will be necessary to examine the nature and proportion of the substances in which they grow, and of those which they themselves contain: thus we shall be enabled to determine which of the latter are derived from the former, and to make other useful conclusions.

In the first place, all plants, excepting the subaqueous, grow in a mixed earth, moistened with rain and dew, and exposed to the atmosphere. Mr. Kirwan observes, that if this earth be chemically examined, it will be found to consist of siliceous, calcareous, and argillaceous particles, often also of magnesia, in various proportions, a very considerable quantity of water, and some fixed air. The most fertile, also, contain a small proportion of oil, roots of decayed vegetables, a coaly substance arising from putrefaction, some traces of marine acid, and gypsum. But if, on the other hand, vegetables be analysed, they will be found to contain a large proportion of water and charcoal; also fat and essential oils, resins, gums, and vegetable acids; all which are reducible to water, pure air, inflammable air, and charcoal: a small proportion of fixed alkali is also found, some neutral salts, most commonly gypsum, tartar vitriolate, common salt, and salt of sylvis. In corn, and particularly wheat, phosphorated selenite is also met with.

It is evident therefore that, on the last analysis, the only substances common to the growing vegetables and the soils in which they grow, are water, coal, different earths, and salts. These, then, are the true food of vegetables: to them we should however add fixed air, though, by reason of its decomposition, it may not be distinctly found in them, or at least not distinguishable from that newly formed during the decomposition of these substances.

According to the Earl of Dundonald, however, vegetables are nourished, supported, and formed by air, water, earth, heat, light, and certain saline substances; and in a particular manner by their own *exuvie* or remains, when reduced to a state fit to answer that purpose.

And the Rev. Doctor Gregory, in his useful work, the Economy of Nature, observes that the nourishment of vegetables may fairly be said to consist principally of water. He is, however, inclined to believe that calcareous earth, in small portions, may enter into the composition of at least many vegetables; since animals, which exist entirely on vegetable food, are found to have in their solid parts, the bones for instance, a portion of this substance, though he confesses that chemical analysis, as far as it has yet gone, does not warrant the supposition that calcareous earth is an essential constituent of all vegetable matter. On some occasions, he farther remarks, the addition of other matters; as of different kinds of manure, adds greatly to the growth of vegetables; but that in whatever degree a rich soil or dung may add to the luxuriance of growth, other facts seem to prove that it is not essential to vegetation. It is well known that many herbs flourish in pure water, and that pear, plum, and cherry trees, planted in pure moss, have arrived at such perfection as to produce good fruit.

We may now examine the separated functions of each of these ingredients or principles.

Of water. That the agency of water is necessary in the process of vegetation, has never been doubted, though the manner in which it contributes to it has not, until of late, been distinctly explained. Doctor Hales has shewn, that in the summer months a sun-flower, weighing three pounds avoird-

upois, and regularly watered every day, passed through it, or perspired, twenty-two ounces each day; that is, nearly half its weight. He also found that a cabbage-plant, weighing one pound nine ounces, sometimes perspired one pound and three ounces; but at a medium about half its weight. Doctor Woodward found that a sprig of common spearmint, a plant that thrives best in moist soils, weighing only 2825 grains, passed through it three thousand and four grains in seventy-seven days, between July and October, that is somewhat more than its own weight each day. He did even more; for he also found that in that space of time the plant increased seventeen grains in weight, and yet had no other food but pure rain-water. He likewise found that it increased more in weight when it lived on spring-water, and still more when its food was Thames water. From whence it may be deduced that grasses and corn, during the time of their growth, absorb about one-half their weight of water each day if the weather be favourable for them. And secondly, that the water they thus pass nourishes them merely as water, without taking any foreign substance into the account; for three thousand grains of rain-water, in Doctor Woodward's experiment, afforded an increase of seventeen grains; whereas by Margraaf's experiments, five thousand seven hundred and sixty grains of that water contained only one-third of a grain of earth: and thirdly, that water contributes still more to their nourishment when it conveys to them earthy and saline particles, as is done by spring and Thames waters. The particular manner in which pure water contributes to the nourishment of plants, besides the service it renders them in distributing the nutritive parts throughout their whole structure, and forming itself a constituent part of all of them, may be readily understood from modern experiments. Doctor Ingenhousz and Mr. Senebier have shewn that the leaves of plants exposed to the sun produce pure air: now water has of late been proved to contain about eighty-seven parts in the hundred of pure air, the remainder being inflammable air. Water is then decomposed by the assistance of light within the vegetable; its inflammable part is employed in the formation of oils, resins, gums, &c.; its pure air is partly applied to the production of vegetable acids, and partly expelled as excrementitious and useless.

It has indeed been asserted by some, that water is the sole food of vegetables; and among the experiments adduced to prove the fact, that of Van Helmont, which has been quoted by the illustrious Mr. Boyle, is by far the most specious. He planted a trunk of willow, weighing five pounds, in an earthen vessel filled with earth dried in an oven, and then moistened with rain-water. This vessel was sunk in the earth, and watered partly with rain-water, and occasionally with distilled. After five years he found the tree to weigh one hundred and sixty-nine pounds; and the earth in which it was planted, being again dried, to have lost only two ounces of its former weight, though the tree had received an increase in weight which amounted to one hundred and sixty-four pounds.

In proceeding to the explication of this experiment, Mr. Kirwan says it must be remarked first, that the weight of the earth contained in the vessel at the commencement and at the end of five years, could not be exactly compared, because the same degrees of deficcation could not be exactly ascertained, and because many of the fibrillæ of the roots of the tree must have remained in the earth after the tree was taken out of the vessel, and these must have prevented the true loss of earth from being perceived. Secondly, that the earthen vessel must have frequently absorbed water impregnated with whatever substance it might contain, from the surrounding earth in which it was inserted; for unglazed earthen vessels easily transmit moisture, as has been shewn by Hales and Tillet. Thirdly, as it appears

that the pot was sunk in the earth, and received rain-water, it is probable that distilled water was seldom employed in this trial.

From the consideration of these circumstances, it will easily appear that the rain-water, absorbed by the tree, contained as much earth as the tree can be supposed to contain. On this experiment Mr. Kirwan observes farther, that, first, the willow increased in weight one hundred and sixty-four pounds in five years; that is, at the rate of 2,7 pounds nearly per month; and it being an aquatic, it cannot be supposed to pass less than its own weight of water each day during the six vegetating months. In the first month, therefore, it absorbed and passed $5 \times 30 = 150$ pounds; and as each pound of rain-water contains $\frac{1}{4}$ grain of earth, fifty grains of earth must have been deposited in the plant; and allowing no more than fifty grains for the deposit of each of the six months, we shall have $50 \times 6 = 300$ for the deposit of the first year; but at the end of the first year the plant gains an accession of thirty-two pounds; therefore in each of the six summer months of the succeeding year, it passes $37 \times 30 = 1110$ pounds of water, and receives a deposit of three hundred and seventy grains; and at the end of the second year the deposit amounts to two thousand two hundred and twenty grains. At the commencement of the third year, the tree gaining a farther accession of 32 pounds must weigh 69 pounds, and pass in each of the summer months $69 \times 30 = 270$ pounds of water, and receive a deposit of 690 grains, which multiplied into 6 = 4140 grains. At the commencement of the fourth year, the tree still gaining 32 pounds must weigh 101 pounds; and if it passes 101×30 in each of the summer months, it must gain a deposit in each of 1010 grains of earth, and at the end of the year 6060. At the commencement of the fifth year it weighs 133 pounds, and gains at the end of the six months 23940 grains of earth. The quantities of earth deposited each year exceed 5 pounds avoirdupois, a quantity equal to that which 169 pounds of willow can be supposed to contain; for the commissioners employed to inspect the fabrication of saltpetre in France, having examined the quantities of ashes afforded by trees of various kinds, found that 1000 pounds of fallow, a tree much resembling the willow, afforded 28 pounds of ashes, and consequently 169 pounds should produce 4,7. Mr. Kirwan does not give this calculation, however, as rigorously exact. It is certain that if the deposit left at the end of every month were exactly taken, the total would exceed the quantity just mentioned; but that found even by this rude mode, sufficiently proves that water conveys a portion of earth into vegetables equal to any that the experiments hitherto made can prove to be present in them.

In respect to the coal, or carbonaceous principle, which this willow must also have contained, Mr. Kirwan observes, that it is probable that much of it existed in the earth in which the willow grew. Some is contained in all moulds or vegetable earth; and as we are not told what sort of earth Van Helmont used, we may well suppose it was good vegetable earth, its quantity amounting to 200 pounds. This principle may also have been contained in the water; for the purest rain-water contains some oleaginous particles, though in an exceeding small proportion, as Mr. Margraaf has observed; and all oil contains coal. Some also may have passed from the surrounding vegetable earth through the pores of the earthen vessel. All the other experiments, adduced to prove that water is the sole food of plants, may, he thinks, be explained in the same manner. Grains of wheat have been made to grow on cotton moistened with water; each produced an ear, but that ear contained but one grain. Here the carbonaceous substance was derived from the grain, and afterwards diffused and transported

through the whole plant by the water absorbed; for it must be observed that grain, like an egg, contains much of the nourishment of its future offspring. It is thus that tulips, hyacinths, and other plants, expand and grow in mere water, without any other substance being added.

It has been shewn by Margraaf, that the earth contained in rain-water is united partly with the nitrous and marine acids, but far the greater part only with fixed air; for the feeble traces of the two former acids could not hold in solution the 100 grains of earth which he found 300 pounds of rain-water contained.

It is therefore evident that by far the greatest proportion of vegetable substances consists of water. The trials of Mr. Young and Mr. Ruckert shew that grass loses about $\frac{2}{3}$ of its weight on being dried into hay. Dr. Hales found a sun-flower plant, which weighed forty-eight ounces, to lose thirty-six ounces by drying in the air during thirty days, and consequently to have lost 3-fourths of its weight. Even vegetables, to appearance thoroughly dry, contain from 3-fifths to 3-fourths of their weight of water. This water is not all in a liquid state, but, by the loss of much of its specific heat, in a great measure becomes in a solid state.

Of coal, or carbonaceous matter. It is to Mr. Hassenfraz that we are indebted for the discovery, that coal is an essential ingredient in the food of all vegetables. Although it has hitherto been but little attended to, it would appear to be one of the primæval principles, even as ancient as the present constitution of our globe: for it is found in fixed air, of which it constitutes above $\frac{1}{4}$ part; and fixed air exists in lime stones and other substances, which date from the very earliest periods.

This substance not only forms the residuum of all vegetable substances that have undergone a slow and smothered combustion, that is, to which the free access of air has been prevented, but also of all putrid vegetable and animal bodies. Hence it is found in vegetable and animal manures that have undergone putrefaction, and is the true basis of their ameliorating powers. If the water that passes through a putrefying dunghill be examined, it will be found of a brown colour; and if subjected to evaporation, the principal part of the residuum will be found to consist of coal. All soils steeped in water communicate the same colour to it in proportion to their fertility; and this water being evaporated, leaves also a coal, as has been attested by Mr. Hassenfraz and Fourcroy. They also observed, that shavings of wood being left in a moist place for nine or ten months, began to receive the fermentative motion, and, being then spread on land, putrefied after some time, and proved an excellent manure. Coal, however, cannot produce its beneficial effects but in as much as it is soluble in water. The means of rendering it soluble are not as yet well ascertained; nevertheless, it is even now used as a manure, and with good effect, as has been shewn by Mr. Young. In fact, the fertilizing powers of putrid animal and vegetable substances were fully known even in the remotest ages, but most speculatists have hitherto attributed them to the oleaginous, mucilaginous, or saline particles then developed, forgetting that land is fertilized by *paring and burning*, though the oleaginous and mucilaginous particles are thereby consumed or reduced to a coal, and that the quantity of mucilage oil or salt in fertile land is so small, that it could not contribute the 100th part of the weight of any vegetable; whereas coal is supplied not only by the land, but also by the fixed air combined with the earths, and also by that which is constantly set loose by various processes, and soon precipitates by the superiority of its specific gravity, and is then condensed in, or mechanically absorbed by soils, or contained in dew. Lands which contain iron in a semi calcined state are thereby enabled to decompose fixed air, the iron, by the help of

water, gradually attracting the pure air which enters into the composition of fixed air, as Mr. Gadolin has shewn: a discovery which appears to Mr. Kirwan the most important of any that has been made in these later times; but these calces of iron may again be restored to their former state by union with oleaginous substances, as Mr. Beaumé has noticed: and this is one of the benefits resulting from the application of dung before it has fully putrefied. Hence we may understand how soils become effete and exhausted, this effect arising in a great measure from the gradual loss of the carbonaceous principle deposited by vegetable and animal manures, and from their passing into the growing vegetables; and also from the loss of the fixed air contained in the argillaceous part of the soil, which is decomposed by vegetables; and from the calcination of the ferruginous particles contained in the soil. This epithet in a great measure is used because other causes contribute to the diminution of fertility; which shall presently be mentioned. Hence also it is evident why lands pastured remain longer fertile than those whose vegetable crop is carried off, as much of the carbonaceous principle is restored by the excrements of the pasturing animals: why some crops exhaust more than others; because corn, and particularly wheat, contains more of the carbonic principle than grasses, and very little of its *exuvie* is left behind: why fallows are of some use; as the putrefaction of the roots of weeds and the absorption of fixed air by clays, are thereby promoted: why vegetables thrive most in the vicinity of towns; because the carbonic principle is copiously dispersed by the smoke of the various combustibles consumed in inhabited places: why foot is so powerful a manure: why burning the clods of grassy land contributes so much to its fertility, and then only when the fire is smothered and coal produced; besides many other agricultural phenomena, which it would be too tedious to relate in this place: but it must not be omitted that the phosphoric acid is found in coal; which is a substance that enters into the composition of different vegetables.

It is evident that the quantity of coal or carbonaceous matter in vegetables must be various, according to their various species, age, and degrees of perfection: wood and corn contain most, grasses least. Wiegand found dry beech wood to contain one-fifth of its weight of coal. Westrumb has discovered that *trifolium pratense*, a sort of clover, contains about one-seventh. From this it would appear, that, after water, it is the most abundant ingredient in vegetables.

Of earths. That which is next in importance as an ingredient for the nourishment of plants is earth; and of the different earths the calcareous seems the most necessary, as it is contained in rain-water; and, absolutely speaking, many plants may grow without imbibing any other. Mr. Tillet found corn would grow in pounded glass; Mr. Succow in pounded fluor spar, or ponderous spar, or gypsum; but Tillet owns it grew very ill; and Haslenfraz, who repeated this experiment, found it scarcely grow at all when the glass or sand was contained in pots that had no hole in the bottom, through which other nutritive matter might be conveyed. It is certain, at least from common experience, that neither grasses nor corn grow well either in mere clay, sand, or chalk; and that in vegetables that grow most vigorously, and in a proper soil, three or four of the simple earths are found. Mr. Bergman, on the other hand, assures us he extracted the four earths, the siliceous, argillaceous, calcareous, and muriatic, in different proportions from the different sorts of corn. Mr. Ruckert, who has analysed most species of corn and grasses, found also the four abovementioned earths in various proportions in every one of them. It may not be improper to introduce a specimen of his analysis, comprehending however the calcareous and muriatic in the same column, as this last hardly deserves to be noticed in a particular way.

One hundred parts of the lixiviated ashes of

		contained of Silex.	Calx.	Argill.
Wheat	-	48 pts.	37	15
Oats	-	68	26	6
Barley	-	69	16	15
Bere	-	65	25	10
Rye	-	63	21	16
Potatoes	-	4	66	30
Red clover	-	37	33	30

Mr. Ruckert seems to have persuaded himself that earth and water, in proper proportions, are the two principles which form the sole nutriment of plants; but Mr. Giobert has clearly demonstrated the contrary; for, having mixed pure earth of alum, siliceous earth, and magnesia, in various proportions, and moistened them with water, he found that no grain would grow in them; but when they were moistened with water from a dunghill, corn grew in them luxuriantly. It is therefore evident that the carbonic principle is essentially necessary.

It is well known that the absolute quantity of earth in vegetables is very small. Dr. Watson informs us that 106 avoirdupois pounds = 1696 ozs. of oak, being carefully burned, left but 19 ozs. of ashes; and from these we must deduct 1,5 for salt, then the earthy part amounts only to 17,5; that is, little more than one part in the hundred. The commissioners appointed to inspect the saltpetre manufactory, found nearly the same result; namely, 1,2 in the hundred: in beech 0,453, and in fir only 0,003. Hence we need not wonder at trees growing among rocks where scarce any earth is to be seen; but in the stalks of Turkey-wheat, or maize, they found seven parts in the hundred of earth, in the sun-flower plant 3,7; so that, on the whole, weeds and culmiferous plants contain more earth than trees do. Mr. Westrumb found *trifolium pratense* to contain about 4,7 parts in the hundred of earth, of which 2 parts in the hundred were mild calx, nearly 2 more siliceous, 0,7 argill, together with phosphorated iron, calx of iron, and manganese in a small proportion.

As it is therefore evident that plants derive some proportion of earth from the soil on which they grow, it cannot be surprising that these soils should at length be exhausted by crops that are carried off; such as those of corn and hay, particularly the former: even lands pastured must at last be exhausted, as the excrements of animals do not restore the exact quantity that the animals have consumed; and hence the utility of mucks, as the restoration is performed by more animals than have been employed in the consumption. Hence also a succession of different crops injures land less than a succession of crops of the same kind, as different proportions of the different earths are taken up by the different vegetables. Finally, we may hence derive the utility of marling land, as the deficient earths are thereby replaced. This subject indeed admits of more precision than has been hitherto imagined, and may even be subjected to calculation. The absolute quantity and relative proportions of the various earths in an acre of land may be determined, so may that in the crops of different vegetables; and by comparing both, the time also may be found in which the land must be exhausted, unless renovated by various manures: thus the necessity of marling. We may also very nearly determine the kind of marle or other manures, and the quantity necessary to an acre of land.

It is very obvious that earths cannot enter into plants but in a state of solution, or at least only when suspended in water in a state of division as minute as if they had been really dissolved. That siliceous earth may be suspended in such a state of division appears from various experiments, particularly those of Mr. Bergman, who found it thus diffused in the purest waters of Up-sal; and it is equally certain that it enters copiously into vege-

tables. His experiments, and more particularly those of Mr. Macie, establish this point beyond dispute. Argillaceous earth may also be so finely diffused as to pass through the best filters; so also may calx, as appears from the quantity Margraaf found in the purest rain-water. This earth is even soluble by means of an excess of fixed air in about 1500 times its weight of water. It may also be and most frequently is converted into gypsum by the vitriolic acid which is contained in most clays, as Mr. Morveau has shewn, and then it is capable of being dissolved in 500 times its weight of water, or thereabouts.

It must also be remembered that vegetables not only require food, but that this food be duly administered to them; a surfeit being as fatal to them as absolute privation. Doctor Hales observed that a young pear-tree, whose roots were set in water, absorbed a smaller quantity of it every day, the sap-vessels being saturated and clogged by it; and Mr. Miller found that too much water rotted the young fibres of the roots as fast as they pushed out. Saturated solutions of dung appeared to Mr. Du Hamel equally hurtful. Now the preservation and due administration of this liquid food are effected by due proportions of the simple earths and their loose or condensed state. Their situation in other respects being the same, those that abound in the argillaceous principle are the most retentive of water: those that abound in the coarse siliceous, least, the calcareous being intermediate between both; various species of vegetables requiring various quantities of water and other food: hence it is that every sort of soil bears vegetables peculiarly adapted to it, while others do not grow at all, or but ill in it. It is plain, from the experiments of M. Bergman, that argill takes up 2,5 times its weight of water when saturated so as to let none drop.

Magnesia	-	-	1,05
Chalk	-	-	0,5
Siliceous sand	-	-	0,25

Of carbonic acid gas or fixed air. This is an important agent in husbandry; though plants do not thrive, but most frequently perish, when surrounded by an atmosphere of it. This is a fact that has long been observed by that excellent enquirer into the most hidden processes of nature, Doctor Priestley. Fixed air, when imbibed by the roots, is however favourable to their growth, as is shewn by the experiments of Doctor Percival of Manchester, and fully confirmed by those of Mr. Ruckert. This last-mentioned philosopher planted two beans in pots of equal dimensions filled with garden-mould. The one was watered almost daily with distilled, the other with water impregnated with fixed air, in the proportion of half a cubic inch to an ounce of water: both were exposed to all the influences of the atmosphere, except rain. The bean treated with aerated water appeared over ground nine days sooner than that moistened with distilled water, and produced twenty-five beans; whereas the other pot produced only fifteen. The same experiment was made on stock-julyflowers and other plants with equal success. The manner in which fixed air acts in promoting vegetation, seems well explained by Mr. Senebier: he first discovered that fresh leaves exposed to the sun in spring-water, or water slightly impregnated with fixed air, always produce pure air as long as this impregnation lasts; but as soon as it is exhausted, or if the leaves be placed in water, out of which this air has been expelled by boiling, they no longer afford pure air: from whence he infers that fixed air is decomposed, its carbonic principle being retained by the plant, and its pure air expelled. Mr. Kirwan thinks also, that by acting as a stimulant, it may help the decomposition of water. Mr. Haufenfraz, indeed, denies its decomposition; but his arguments do not appear to Mr. Kirwan to be conclusive. The vitriolic acid contained in various clays brought into multiplied contact with calcareous earth by the agitation of soils in agricultural opera-

tions, and the motion of the roots, gradually sets loose the fixed air contained in this last-mentioned earth; that portion also of this earth, which is by water introduced into the plant, is decomposed, and its air set loose by the vegetable acids which the plant contains within it.

Of saline substances. Substances of this kind, gypsum and phosphorated calx being excepted, seem to serve vegetables in the way they do animals, rather as a *condimentum*, or promoter of digestion, than as a *pabulum*. This idea is suggested by the smallness of their quantity, and the offices they are known to perform. Their quantity is always smaller than that of the earth; and this we have already seen to be exceeding small indeed when compared with the other parts.

Hence, one thousand pounds of			lb.
Oak girdle of saline matter only	-	-	1,5
Elm	-	-	3,9
Beech	-	-	1,27
Fir	-	-	0,45
Vine branches	-	-	5,5
Fern	-	-	4,25
Stalks of Turkey wheat	-	-	17,5
Wormwood	-	-	73,
Fumitory	-	-	79,
Trifolium pratense	-	-	0,78
Vetches	-	-	27,5
Beans with their stalks	-	-	20,

All the experiments that have hitherto been made, shew that the proportion of saline matter to the earthy is the smallest in woods; in other plants, generally as 1 to 1,3, 1,5, or 2: however, Mr. Ruckert has marked some exceptions, which may be mentioned as deserving of the attention of those engaged in the improvement of land. It is found that the proportion of saline substances to the earthy, is,

In Hemp	-	as	1	to	8.
Flax	-	-	1	to	1,7 nearly.
Parsnips	-	-	1,1	to	1.
Potatoes	-	-	1	to	1,3
Turnips	-	-	1	to	3,33
Wheat	-	-	1	to	3-
Rye	-	-	1	to	8.
Oats	-	-	1	to	8.

It might be shewn that these proportions have some analogy to the quantity and sort of manure proper to be employed in the cultivation of these plants and the succession of crops; but such an enquiry would be too extensive for the present purpose.

Those salts that are generally extracted from the ashes of vegetables, are vitriolated tartar, Glauber's salt, common salt, salt of Sylvius, gypsum, phosphorated calx, and fixed alkaline salts.

Alkalis. These salts seem to be the product of the vegetable process, for either none or scarce any are found in the soils, or in rain-water, while in the vegetable they are most probably neutralized, partly by vegetable acids which are decomposed in the process of combustion, and partly by the vitriolic and marine acids. Westrumb found vitriolated tartar and digestive salts in the juices of the trifolium.

Gypsum. It is probable that this substance exists in greater quantity in plants than it appears to amount to after combustion and lixiviation; much of it must be decomposed during the combustion, and still more during lixiviation, by the alkalis existing in the solution. Thus the apparent quantity of vitriolated tartar is increased.

Phosphorated calx. This substance is found in the greatest quantity in wheat, where it contributes to the formation of the animal gluten. Hence in rainy years the quantity of gluten in wheat has been observed to be smaller than in dry ones. Hence also the excellence of bone-ashes as a manure for wheat; and

hence wheat succeeds best after clover, if the clover be fed off, but not if it be mowed, as Mr. Young has observed, because much of the phosphoric acid is communicated by the dung of animals, which is scattered on the ground.

It would seem that the chief use of vitriolated tartar is its promoting the decomposition of water, a circumstance which Mr. Senebier has pointed out with great ingenuity.

SECT. IV. *Of the Constitution of Fertile Soils.*

FROM what has been already said, it will appear that the most fertile soil is that which contains the greatest quantity of the food of those vegetables that nourish men and useful animals, and which administers it to them in due proportions. Therefore the first essential requisite to a fruitful soil is, that it contain a sufficient quantity of the three or four simple earths which have been mentioned above, and of the soluble carbonaceous principle. The other requisites are, that the proportion of each, and general texture of the soil, be such as to enable it to admit and retain as much water as is necessary to vegetation, and not any superabundant quantity.

It must be pretty evident from what has been said above, that the retentive powers of moisture are very different in the simple earths: therefore the proportions in which the fertility of a soil requires them to be mixed, must be different in climates and countries that differ considerably in moisture; in the *drier*, they must be such as are most retentive; in the *moister*, such as suffer it to pass or evaporate in a more speedy and free manner. The same observation also extends to situation. Lands on a plain should be so constituted as to be less retentive of water than those situated on a declivity; this is extremely evident from the very nature of their different positions. So likewise lands that have a retentive or impermeable subsoil, should be differently constituted from those that have one less retentive or more permeable. The time of the year in which rain most abundantly falls is also deserving of particular attention. These different circumstances must undoubtedly modify the conclusions which are to be drawn from the following experiments, which have been made with a view to determine the principles of fruitful soils.

Analysis of a fertile soil in a climate extremely rainy. By an analysis of Mr. Giobert, which has been communicated to the public, of a fertile soil in the vicinity of Turin, where it rains yearly above 40 inches on the square foot; it was found that 1 pound of it contained from 20 to 30 grains of extractive matter which flamed and burned, and therefore was a coal soluble in water; 26 pounds of it contained 1808 grains of water. The simple earths were in the following proportion in the hundred weight:

Of Silex, from	-	77 to 79
Argill	-	9 - 14
Calx	-	5 - 12

From this the pound troy should contain

	grs.
Carbonic matter	- 25
Water	- 70
Silix, from	4362 to 4475
Argill	- 509 - 793
Calx	- 283 - 679

The above author also found that it contained a great deal of air, even as much as 19 grains, of which one-third was fixed, and the remainder heavy inflammable air; but not any ammoniac or volatile alkali. In this account both the weight of the cubic foot of this soil and its specific gravity are omitted; therefore neither its texture, nor the quantity of each ingredient, can be directly ascertained; but, from the necessity of its being in some degree open, and the weights of good soil as found by Mr. Fabroni, Mr. Kirwan is led to conclude that its

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specific gravity could not exceed 1,58; consequently a cubic foot of it should weigh about 120 pounds troy, or 100 avoirdupois.

In other soils which were less fertile, Mr. Giobert has determined the proportions as follow:

Silix, from	48 to 80
Argill	- 7 - 22
Calx	- 6 - 11

It is therefore evident that the troy pound contained, of

Silix, from	2716 to 4528
Argill	- 396 - 1245
Calx	- 339 - 622

allowing 100 grains for moisture, as either the calx or argill exceeds the proportions in more fertile kinds of ground. There is an omission of the specific gravity of these soils in the experiments of Mr. Giobert; it is probably, however, not very different from that of the more fruitful soils, perhaps a little above or below them.

Inbarren soils, the proportions were found by the same author to be

Of Silix, from	42 to 88
Argill	- 20 - 30
Calx	- 4 - 20

Therefore the troy pound contained, allowing 120 grains for water,

Silix, from	2368 to 4963
Argill	- 1128 - 1622
Calx	- 225 - 620

Here also there is an omission of the specific gravity of the soils; but Mr. Kirwan supposes it to be either much above or much below that of the former, as they are either too close or too open. Mr. Fabroni found that of barren sandy land 2,21. It is also necessary to observe, that if the proportion of water be different from that here supposed, the contents of the troy pound will also be different; but this is a circumstance that may readily be adjusted.

Analysis of a fertile soil, on which the fall of rain was 24 inches. It was found by Mr. Bergman that a fertile soil, situated on a plain, where the yearly fall of rain amounted to 23,9 English inches, contained four parts clay, three of siliceous sand, two of calcareous earth, and one of magnesia. The composition of the clay he has not expressly mentioned, but it may be supposed that it was such as most frequently occurs, containing 66 parts in the hundred of fine siliceous sand; and 34 of mere argill; consequently 0,40 of it contained nearly 0,14 of mere argill, and 0,26 of fine siliceous sand. The siliceous sand, which he has mentioned, is what we call gravel, consisting of stone from the size of a pea, or less, to that of a nut. This amounts to 30 parts in the hundred. Therefore the proportions may be thus stated:

Coarse Silix	-	30
Finer	-	26
		56 parts
Argill	-	14
Calx	-	39
		100

It is obvious that the use of the gravel is to keep the soil open and loose: a circumstance absolutely necessary, and which has been already adverted to. The specific gravity is not stated, but Mr. Kirwan thinks that it should not much exceed 1,600. Muschenbroek found that of garden-mould 1,630. With the carbonic matter Mr. Bergman was unacquainted. On the whole the proportion in a troy pound, supposing the quantity of water and coal not to exceed 100 grains, will stand thus, fractions being omitted:

5 T

Gravel	-	-	1698
Fine sand	-	-	1471
			<hr/> 3169
Argill	-	-	792
Calx	-	-	1698
			<hr/>

In this we see that the quantity of calx is much greater than in the soil of Turin, where the fall of rain is greater; for in the drier climates there is a necessity to retain the rain; and the argill, if increased, would retain it too long and too much, and, besides, enters very sparingly into the constitution of plants, as has been already shewn.

For the following experiments we are indebted to Mr. Tillet; they were made at Paris, where the fall of rain, on an average, amounts to 20 inches. This ingenious philosopher filled a number of pots twelve inches in diameter at the top, ten at bottom, and seven or eight deep, with mixtures of different earths. It seems also that they were porous enough to absorb moisture, and that they were perforated at the bottom. These he buried up to the surface in a garden, having previously sowed in each some grains of wheat, when they were left to themselves.

Fertile mixtures. The first mixture he found fertile consisted of three-eighths of the potters' clay of Gentilly = 0,375, three eighths of the parings of limestone, and two-eighths of river-sand = 0,25. In this the corn grew very well for three years; which was the length of time that the experiment continued. But as potters' clay is not pure argill, and as Mr. Tillet has not mentioned the proportion the mere argillaceous part bore to the siliceous, Mr. Kirwan has endeavoured to supply this deficiency, by supposing the clay to contain near one-half its weight of pure argill, it being clay of this sort that potters generally make use of: and that of Gentilly being esteemed one of the best. Both the clay and limestone, Mr. Tillet observes, were pulverized, that they might more exactly incorporate when mixed. In this case the centesimal proportions will stand in the following manner:

Coarse Silex	-	25
Finer	-	21
		<hr/> 46
Argill	-	16,5
Calx	-	37,5
		<hr/> 100

It is therefore plain that the quantities in the troy pound, supposing the water, &c. to amount to 100 grains, will be

Coarse sand	-	1415
Finer	-	1188
		<hr/> 2603
Argill	-	934
Calx	-	2122
		<hr/> 5659

The second mixture contained two-eighths of potters clay, three-eighths parings of limestone, and three-eighths coarse sand. The centesimal proportions are therefore,

Coarse sand	-	37,5
Finer	-	14
		<hr/> 51,5
Argill	-	11
Calx	-	37,5
		<hr/> 100

Hence in the troy pound, supposing the quantity of water to

amount to 100 grains, the quantities of the three earths will be as follows:

Coarse Silex	-	2122
Finer	-	792
		<hr/> 2914
Argill	-	622
Calx	-	2122
		<hr/> 5658

It is obvious therefore that in the drier countries, where the fall of rain is but 10 inches, the soil, to be fertile, must be closer, and the quantity of calcareous earth much increased, and that of the siliceous much diminished. Thus, in the climate of Turin, where the fall of rain exceeds 40 inches, the proportion of siliceous earth is from 77 to 80 in the hundred, and that of calcareous, from 9 to 14; in order to suffer this excess of rain more easily to evaporate. In the climate of Upsal, where the fall of rain is 24 inches, the proportion of silex is only 56 in the hundred, but that of calx is 30; and in the climate of Paris, which is still drier, the proportion of silex is only from 46 to 51, and that of calx 37,5 in the hundred; and hence we may perceive the necessity of attending to the average quantity of rain to judge of the proper constitution of fertile lands on fixed principles.

The proportions vary considerably in the two last mixtures: The first may serve as a model for the heavier soils, and the second for the lighter. In these and the following experiments, the carbonic principle seems to have been extracted from the surrounding garden-mould with which the pots communicated, by means of their bottoms being perforated with holes.

Barren mixtures. 1. In his sixth and eighth experiments, Mr. Tillet mixed three-eighths of potters' clay with three-eighths of parings of limestone and two-eighths of fine sand: the only difference between this mixture and that of the first experiment was, that in the first experiment coarse sand was used, and in this fine, yet the former was fruitful in the highest degree; but in this the grain prospered indeed the first year, but sickened in the second, and failed in the third: the proportions have been already stated. In this case we have a clear proof of the necessity of an open texture in soils, without which the best proportions will not be successful.

2. In the thirteenth experiment a mixture of two-eighths potters' clay, four-eighths coarse sand, and two-eighths marle was employed. In this case the corn grew well the first year, poorly the second, and decayed the third. The composition of the marle is not mentioned; but supposing it to contain 70 in the hundred of calx, and 30 of clay, of which the one-half is argill, it would form one of the richest sorts of marles. The centesimal proportions of this mixture should be as follow:

Silex	-	50 + 14 = 64
Argill	-	11 + 8 = 19
Calx	-	17
		<hr/> 100

Also in the troy pound, supposing the water, &c. to amount to 100 grains, the quantities will be these:

Silex	-	3622
Argill	-	1075
Calx	-	962
		<hr/> 5659

It would seem that the sterility of this mixture proceeds from a defect of calcareous earth. If we suppose the marle poorer in that earth, the defect will be still greater. The retentive

powers of the different earths with respect to water, being expressed by the quantities which each can retain without suffering any to drop, as stated above, and the quantities retained by the mixed mass of these earths being proportional to the respective quantities of each, it should seem that in fertile soils, where the fall of rain is from 20 to 30 inches, this power should not exceed 70, nor fall short of 50 in the hundred. It would be of great consequence, Mr. Kirwan thinks, to settle this point with precision; but to do it would require more numerous experiments. In explanation of which one example may be given.

The retentive power of the fertile soils which have been mentioned by Bergman, will furnish us with an instance. A soil of this kind contains, as has been already shewn,

Of Silex	-	56
Argill	-	14
Calx	-	30
And the retentive power of 100 parts		
Silix	=	25
Argill	=	250
Calx	=	50
Therefore the retentive power of		
56 parts Silix	=	13
14 - Argill	=	35
30 - Calx	=	15
— 63.		

But before we leave the experiments of Mr. Tillet, it may be proper to mention a few others which have been made by the same author, but which seem to invalidate the necessity of the presence of the three simple earths in such soils as are fruitful.

1. It appears by his 26th experiment, that he only employed pure sand, such as is used for making glass; yet corn grew well in it the first year, indifferently the second, and nearly failed in the third. But Mr. Hasenfranz having repeated the experiment in pots unperforated, did not find it to succeed even the first year; therefore the success of Mr. Tillet was owing to the perforation at the bottom of his pot, through which water impregnated with the different earths, and coal must have passed. In fact, Mr. Tillet's conclusion is contradicted by the universal experience of those who have attended to this point.

2. We find by his 28th experiment, in which powdered limestone only was employed, that the corn sown prospered exceedingly during the three years. To the cause mentioned in treating of the 26th, Mr. Kirwan adds, that the limestone he used was that of St. Leu, which contains clay, and consequently siliceous and argill; and which is so porous as to admit from 3-19ths to 1-5th of its weight of water, as Mr. Brisson has shewn; it thus becomes easily decomposed. The coarse powder to which it was reduced answered the same purpose as coarse siliceous; and the finer might nourish the plants which were contained in it.

3. The 30th experiment is that in which he employed mere potters' clay; the grain grew tolerably well the first year, but perished the second; on the third it flourished most. It would be difficult to draw any specific conclusion from this experiment, for it is plain that if the texture were not much looser than that of clay, the corn could not grow at all, as was the case in his 6th and 8th experiments, already mentioned, and as Mr. Hasenfranz, who repeated this experiment, observed. Rain-water might however, as Mr. Kirwan supposes, supply a small quantity of calx sufficient for a small produce of corn in this instance.

Mr. Kirwan also thinks that soils on the declivity of hills, ought to be more retentive of water than those on plains.

SECT. V. Of the most suitable Manures and Processes for different Soils.

THIS is a subject of great difficulty, and which can only be satisfactorily explained from the general practice of the most

skilful farmers, corrected and improved by the more precise determinations and restrictions of theory. The causes of the beneficial effects of many different kinds of manure in various instances may however in some degree be ascertained by the theory which we have endeavoured to establish in the preceding sections. The whole would seem to rest on this simple proposition;—that *manures are applied to supply either the defective ingredients of a soil, improve its texture, or correct its vices.*

It will now be necessary to consider each soil in particular, as well as the manures which are most adapted to render them fertile.

Of clayey soils and their proper manures. Experience has shewn that the best manure for clayey soils is marle; and in this indeed all the books of agriculture are agreed; but of the different sorts of marle, that which is most calcareous is found to be the best; the siliceous next best; limestone-gravel best of all; and argillaceous marle least advantageous of any of them.

It is now pretty well known that clayey soils are defective both in constitution and in texture; they want the calcareous ingredient and coarse sand. Calcareous marle supplies the calcareous ingredient chiefly: limestone-gravel both. The other marles supply them in a lesser degree. If the clay be analysed, and its proportion of sand and argill known, the species of marle most advantageously applicable may be determined still more certainly. For instance, if the argill notably exceeds or even amounts to the proportion of 40 or 50 in the hundred weight, calcareous marle or limestone-gravel will be the best improving manure, as they contain most of the calcareous ingredient; but if the siliceous ingredient amounts to 75 or 80 in the hundred, as it sometimes does, argillaceous marle will be the most suitable, and afford the greatest improvement. But a mixture of marle and dung is still more advantageous, because the dung supplies the carbonaceous ingredient. But the marle must be used in the same quantity as if dung had not been applied, otherwise the operation must be more frequently repeated. How the quantity of marle or other manure can be estimated, will be shewn hereafter.

But in situations where marle cannot be had, a mixture of coarse sand and lime perfectly effete or extinguished, or even chalk, will answer the same purpose, as it will supply the defective ingredient, and open the texture of the clay; so also sand alone, or chalk, or powdered limestone, may answer, though less advantageously. Lime alone appears to Mr. Kirwan to be less proper, as it is apt to cake, and does not sufficiently open the soil. However, where these manures cannot be had, coal-ashes, chips of wood, burned clay, brick-dust, gravel, or even pebbles, are useful, as Mr. Young has shewn; for all these improve the texture, and the former also supply the carbonaceous ingredient. Here Mr. Kirwan lays down another general maxim; which is, That *dung is a proper ingredient in the appropriated manures of all sorts of soils*, as it supplies the carbonaceous principle to them.

Of clayey loam, and the manures proper for it. It appears that this soil is defective either in the calcareous ingredient, in the sandy, or in both: if in the first, the proper manure is chalk; if in the second, sand; if in both, siliceous marle or limestone-gravel, or effete lime and sand, are the most proper.

In respect to the quantity of chalk that should be employed, considered abstractedly, it should be directly proportional to the defect of the calcareous matter; but as such a quantity cannot be added without diminishing the proportion of one of the other ingredients, a much smaller quantity must be employed, or else a substance which may convey some proportion of the other ingredient. The same observation holds also with respect to sand. Thus we have seen, in the preceding section, a clayey loam, in which the sandy ingredient was defective, and the argillaceous superabundant, but the calcareous exact. The composition of it stood thus:

Of Sand and Gravel	-	47
— Argill	-	22
— Mild calx	-	31

In this soil the sandy part wants 10 in the hundred: the argill is superabundant; but we cannot increase the proportion of sand without diminishing that of calx. Hence we must either use a smaller proportion of the sandy ingredient than its defect requires, or apply a substance that would supply some proportion of the calcareous ingredient also: such are limestone-gravel, siliceous marle, effete lime, mixed with sand or pounded limestone. Suppose the proportion of the substance to be employed were six in the hundred; that is, six pounds for every hundred pounds of the soil, the quantity requisite for an acre would be about 208 cart-loads, reckoning the cart-load at 1,500 pounds.

The Earl of Dundonald says, that the process of paring and burning may be practised with advantage on some clayey soils, as the burnt clay will diminish the stiffness of them, and render them more porous to water.

Chalky soil, and the manures proper for it. It has been found that this soil wants both the argillaceous and the stony, sandy, or gravelly ingredients; therefore the best manure for it is clayey loam, or sandy loam; but when the chalk is so hard, as it frequently is in this country, and so difficultly reducible to impalpable powder as to keep of itself the soil sufficiently open, then clay is the best manure, as in such cases the coarse sand or gravelly ingredients of loams are of no use. Some think, it is true, that pebbles in a field serve to preserve or communicate heat. This use, however, is not yet ascertained with sufficient accuracy.

Chalky loam, and the proper manures for it. Experience has shewn that the best manure for this soil is clay, or argillaceous marle, if clay cannot be had; because this soil is defective, principally in the argillaceous ingredient. In Ireland, chalky soils or loams seldom occur, but light limestone soils frequently, and these do not differ essentially from chalky loams poor in argill: clay, therefore, and often the soil of bogs, may serve as a manure for them. Soils of this kind are frequently fertile, and well adapted to the culture of wheat and beans.

Sandy soils, and their proper manures. Mr. Young asserts that the best manure for these is calcareous marle, which exactly corresponds with the theory which has been advanced above; for these soils want both the argillaceous and the calcareous ingredients; and this marle supplies both: the next best is argillaceous marle; and next to these, clay mixed with lime, or calcareous or clayey loams. In Norfolk, they seem to value clay more than marle, probably because their sandy soils already contain calcareous parts; possibly also they misname marle, calling mere chalk by that name. Lime or chalk are less proper, as they do not give sufficient coherence to the soil; however, when mixed with earth or dung, they answer well, because in that case they form a sort of marle or compound, comprehending the defective ingredients, or those which are wanted in order to render this soil fertile.

Sandy loams, and their proper manures. It seems that these soils are defective chiefly in the calcareous ingredient, and in some degree also in the argillaceous; their texture too is imperfect, as they abound both in fine and coarse sand; chalk or lime would supply the first defect, but would leave the texture unamended. Hence they are used when better manures cannot be had; yet calcareous or argillaceous marles are most proper. Clay, after land has been chalked, we are informed, answers remarkably well, because it remedies the texture very conveniently.

Gravelly loams, and their proper manures. It is certain that these soils are benefited by the application of marle, whether argillaceous or calcareous, for reasons which are now sufficiently apparent: if the gravel be calcareous, clay may be employed. A mixture of effete lime and clay should answer in all cases of this kind of soil.

Ferruginous or vitriolic soils, and their proper manures. Soils of this kind necessarily require the calcareous ingredient, in order to neutralize their peccant acid: hence chalk, limestone-gravel, lime and calcareous marle, are most advantageously applied to these sorts of land.

Boggy soils, and their proper manures. After these have been well dried by sufficient drains, the nature of their soil should be explored by analysis, and an appropriate manure applied. In general, they should first be burned, if capable of that operation; then gravelled. If their upper parts contain a sufficiency of the carbonaceous principle, as often happens, they need not be burned. Limestone-gravel will answer best, or lime mixed with coarse sand or gravel, because in general they are of a clayey nature; if more sandy, lime may answer well, or calcareous marle. The preference in these cases must be decided by the result of the analysis which has been made.

Heathy soils, and their proper manures. It is necessary, in the first place, that these should be burned in order to destroy the heath and increase the carbonaceous principle; they should then be analysed, and the defective principles supplied. Lime is said to destroy heath, and so does limestone-gravel: this is fittest when the soil is clayey; lime when it is gravelly. Gypsum also answers remarkably well in cases where the soils are dry and hard.

SECT. VI. Of Particular Manures and Processes.

IN the preceding part of the Treatise we have considered most of the known soils, and examined the manures which tend most to their improvement. But there are yet some other manures and processes employed by the practical farmer, the mode of action of which is by no means generally understood. It will therefore be proper to consider their nature more particularly, and explain their manner of operating more fully in this place.

Of the process of draining as a means of improving the soil. The general object or intention with which this process is employed, has been already described. We must therefore now give some account of the means by which the beneficial effects produced by its operation are accomplished. The observations of the Earl of Dundonald on this subject seem to deserve attention. He says that though water constitutes a principal part of the food of plants, it is obvious that certain degrees of cold must prevent its being absorbed by them. Therefore water, during the continuance of such degrees of cold, cannot be of any service; its presence at these times generally proving hurtful to the future growth of the vegetables. For this reason rain, during the cold winter months, is prejudicial, while the warm summer showers have an opposite effect. From which it is plain, he thinks, that, when vegetation is not advancing, or but tardily proceeding, the land should be preserved as dry as it is possible to keep it.

Though advantages may be yielded to certain soils at particular seasons, by artificial watering, he thinks that greater and more extensive benefits may be derived from a more complete and general drainage of the surface. The attention of the farmer should not therefore, in his opinion, be called away to other objects, such as the irrigation of meadows, &c. before he has relieved his grounds of their injurious surface water, as the full advantage cannot previously be obtained from such means.

Besides the method of perfect drains, lands may be made dry, he observes, by such a mechanical change in the component parts of the soil, as render it less retentive of moisture. In stiff lands this is to be effected by lime, chalk, marle, coal-ashes, brick-dust, or calcined clay, and by sand when applied in large proportions.

Fallowing. This is an important operation in the practice of farming, though the reason of its producing such beneficial effects is not yet generally known.

The Earl of Dundonald supposes, that as alkaline salts act more powerfully on some kinds of peat and inert vegetable matters than on others, especially on those which become oxygenated by exposure to the action of the air, the practice of fallowing ground containing much vegetable matter, by repeatedly exposing fresh surfaces to the operation of the air, may occasion the peat or vegetable matter to be more easily dissolved or acted upon by these salts; but that when no such application is made, the insolubility of the vegetable matter is increased by the process of fallowing, which to certain grounds may, he thinks, prove an injury, rather than a benefit. The solution or putrefaction of vegetable substances is, in his opinion, more speedily promoted by a close or stagnated state of the air, than by a constant supply and addition of oxygen or pure air, as happens to these substances when subjected to the process of fallowing.

He therefore contends that clover, sainfoin, cabbages, turnips, leguminous crops, hemp, and those plants which overshadow the ground, and cause a stagnation of air, thereby preventing the excessive exhalation of moisture, and promoting the putrefaction or decomposition of vegetable matters contained in the soil, will prove more economical and advantageous to subsequent crops than the present practice of fallowing. By this last process, says he, not only one year's rent and labour are lost, but the vegetable matter contained in the soil is thereby rendered less fit to promote the growth of subsequent crops. Consequently fallowing, he thinks, should be practised sparingly; its principal use consisting in altering the mechanical arrangement of the soil, either by pulverizing it, or making it more compact, both of which effects, according to circumstances, being thereby produced, and in destroying root, seed weeds, or insects. These objects being therefore obtained, recourse, in his opinion, should never be had to the same operation, unless it becomes necessary from the failure of crops, or other incidental causes, which, he says, are best provided against by substituting the culture of drill crops instead of a fallow.

The same author suggests it as probable, that soils which contain much inert vegetable matter, may derive advantages from unbrageous green crops without the process of fallowing, equal to those experienced when hemp is made to precede a crop of wheat; without which preparation this crop would not have been equal to the expectations of the farmer.

It is therefore, he thinks, sufficiently evident, that if ground receive benefit by being overshadowed, the same ground, by a directly opposite method of treatment, must be injured.

The Rev. Doctor Gregory, in a very judicious work intitled "The Economy of Nature," observes, that the custom of letting lands lie fallow has not yet been satisfactorily explained; something may no doubt be attributed to the destruction of weeds, but more probably to some change produced in the soil, by its being exposed to the action of the sun and air. The management of nitre-beds may, he thinks, tend to throw some light on this subject. These are composed of calcareous earth and dung cemented together. After being exposed for some months to the air, they are found to contain a quantity of nitrous acid, which, uniting to the calcareous earth, forms a kind of salt, which is extracted by lixiviation. Now calcareous earth and dung are two of the most powerful kinds of manure, and it does not seem improbable that their fertilizing powers may be in some manner connected with their property of affording nitrous acid.

Of paring and burning. It has been found that this mode of improvement is not particular to any species of soil, though poor soils, that have few vegetables growing in them, will certainly profit by it in the least degree.

Its particular advantages are, first, that it converts vegetables and their roots into coal. Hence it is that agricultural

writers tell us, though without knowing the reason, that all violence of fire is to be avoided, and that a slow smothering fire is the most proper for this purpose. Secondly, that it destroys the old sickly roots, and thus leaves room for others younger and more vigorous. Many have imagined that it diminishes and consumes the soil; but repeated experience has shewn the contrary. It is well known that clays and loams are rather hardened than consumed by heat. However, unless fresh seeds be committed to the earth, the soil will be unproductive for a number of years; the coaly principle may also be exhausted by too much cropping.

We are told by an ingenious writer, whom we have frequently quoted, the Earl of Dundonald, that moors overgrown with ling or heath, peaty soils, or such as are covered with a sward of coarse unprofitable herbage, and contain a superabundance of vegetable matter, may, with due precaution, be subjected to this process with very beneficial effects. It may also, he supposes, be attended with advantage to strong clayey soils, from the effect that burned or half-burned clay has in rendering such soils more open and less tenacious. In which case the benefit arising from the mechanical arrangement of the soil will probably more than compensate for the dissipation of the vegetable matter of the sward. It is however suggested, that it would be more economical, when the soil is thus intended to be made more open, to calcine the clay in clamps or kilns, and afterwards spread it on the ground, either in its simple state or mixed with lime. Paring and burning are the processes which, in the cultivation of peat mosses and fens, are made to succeed the operation of draining. In this case, care, the author observes, should be taken to burn only as much of the peat as will yield the proportion of ashes necessary to alter the arrangement of the parts of the soil: an effect, he thinks, which with still more advantageous consequences may be attained by lime, limestone-gravel, or even by common mould.

The ashes of fresh or growing vegetables alone produce saline substances or alkaline salts; none can be procured from peat or decayed vegetable matter. The proportion of alkaline or other salts produced by paring and burning is so very small, that if the benefits immediately arising from these processes were to be ascribed solely to them, it might, he says, perhaps be more economical to purchase them at the market price.

The saline matter produced in these processes generally consists of vitriolated tartar, the alkali of the burnt vegetable combining with the sulphuric or vitriolic acid, which, in different states of combination, is contained in most soils. Vitriolated tartar has very powerful effects in promoting vegetation; but as it is not to be procured in sufficient quantity for the purposes of agriculture, the deficiency may be supplied by Epsom and Glauber salts, the effects of which he asserts to be equally beneficial when applied to the ground.

But although these processes of paring and burning have been much recommended, our author thinks that they require great limitation and restriction, and considerable judgment to direct them properly.

If it should be found hereafter that the same advantages can be derived from the application of lime, alkaline, neutral and other salts, without the disadvantages, a decided preference will be due to these methods.

Of gypsum. This is a manure which was first discovered by Mr. Mayer, a German clergyman, in the year 1768: it has since been applied with signal success in Germany, Switzerland, France, and America. If, in our own country, it has not been so much approved of, it is probably because the calcareous principle prevails almost universally. It is clayey lands that are most improved by this manure. The time for spreading this substance is February, March, or even later in the spring, when it is to be thinly sowed on the land at the rate of about

eight bushels to the acre : more would be hurtful. The *rationality* of its effects may be deduced from its extraordinary septic power, for it is found to accelerate putrefaction in a higher degree than any other substance ; and for this reason it is not ploughed-in like other manures, but barely strewed on the surface of the land : and this is done in the month of February, or later, in order to convert the old grass quickly into coal, to nourish the young growth.

Mr. Kirwan thinks that it may also be useful, from its being itself no inconsiderable part of the food of many plants, particularly of clover, pulse, and corn ; but the land on which it is strewed should be dry, such as would naturally suit clover, &c. otherwise it would be useless to make such a trial.

In America this manure has been sown on sand, loam, and clay-land, without there being much difference in the beneficial effects which it produced. Its effects were however soonest evident on the sandy soils.

The duration of this manure seems to be from seven to twelve years ; but, like other manures, its continuance very much depends on the nature of the soil to which it is applied.

A piece of grass land in a worn-out field being covered upwards of two inches thick with barn manure, and another piece in the same field being sown with gypsum for the purpose of contrasting it with that which was dunged ; of three crops, that piece of ground to which the gypsum was applied, in every one, produced the greatest quantity.

P A R T II.

OF THE PRACTICE OF HUSBANDRY.

AFTER this view of the principles and theory of the Science of Husbandry, we may proceed to the consideration of the practical part, or the particular management which is necessary in order to render the ground the most highly productive and advantageous.

SECT. I. *Of the different Kinds of Husbandry.*

IN the practice of this useful art two different methods have chiefly been followed ; which has occasioned its division into two distinct kinds, to which the titles of *Old* and *New* Husbandry have been applied. The former is that which has been practised in all countries from the most early periods ; and the latter that introduced by the ingenious Mr. Tull, and which is also frequently called the *horse-hoeing husbandry*. In the first method of proceeding the farmer evidently attended too little to the advantages of properly breaking, crumbling, and pulverizing the soil ; these operations being performed in a very inadequate and imperfect manner.

It has since, however, been found by experience, that the more perfectly these processes are performed, and the cleaner from weeds the soil is kept, the larger, the clearer, and more valuable is the produce. At the same time, however, attention must be paid to the nature of the soil and climate : a thin light soil, from its weakness, must be less disturbed than land that is strong and heavy, and it will be necessary in the former to have the intervals larger than in the latter. It is clear, however, that land, though ever so well tilled in the autumn, when wheat for instance is sown, hardens and soddens in the winter ; its particles, beaten down by heavy rains, and sunk by their own weight, approach each other daily more and more : the roots of the plants cultivated have consequently less and less room to extend themselves in quest of their necessary food ; and their interstices in the earth become of course so few and close, that they are not able to pierce through them, while weeds spring up, and rob them of their nourishment. By this means the earth, reduced to nearly the same condition as if it had not been ploughed at all, is unable to assist the plants sown in it, in the spring, when they ought to shoot with the greatest vigour. They consequently then stand most in need of the plough to destroy the weeds, to lay fresh earth to their roots in the room of that earth which they have exhausted, to break the particles of the ground anew, so as to enable their roots to spread, in order to their gathering an ample provision of food, which at that time is of the greatest service in promoting their growth.

It is obvious that, in the old or common husbandry, the whole attention is to provide a great store of nourishment for the grain, at a time when it scarcely consumes any, as it then

produces only a few blades, after which it is left to itself, at a season when it might and should be most assisted by proper culture ; a management which seems to be extremely preposterous and inconsistent.

That there is a very great advantage in having land in a fine state of cultivation or tillage before it is sown, is universally acknowledged ; but the farmer should not stop at those first preparations. Plants require a continuation of culture while they grow, and therefore should not be forsaken until they have attained a state of maturity, and are perfectly formed.

Those who object to the frequent ploughings used in the *New* Husbandry, are afraid of drying the earth too much ; because they suppose the moisture escapes more easily from a soil which is well loosened, than from a hard and compact earth. But on the contrary, it is evident from many experiments, that, even in the driest weather, land cultivated according to the new method, continues constantly moister than that which is managed in the old way. Instead of a stagnant wet, more hurtful, probably, than beneficial, to vegetation ; earth, when made fine to a considerable depth, is better prepared to absorb and retain the dew, which, when it falls upon the land that is untilled, or but poorly tilled, does not sink far, but is quickly carried off by the heat of the sun. That dew is a great fertilizer of the earth, has been repeatedly proved ; and that it will penetrate so deep in a fine loose soil, as to keep that moist, while the ground badly tilled is parched up, seems evident from many experiments.

But further and perhaps stronger proof of the benefits which arise from stirring the ground well and often between plants while they are growing, may be deduced from the common method of raising Indian corn ; for in this case there is a constant repetition of ploughing and hoeing between the rows of the grain.

Experience also shews, that if several rows of wheat be sown in a poor but well-ploughed land, the blades of the corn will turn yellow in the spring, especially in dry weather. But that if the earth bordering upon these rows be ploughed deep, in some places near, and in others farther from the rows, the plants will resume their proper colour ; first in the places nearest to the new ploughed ground, and afterwards gradually in the others, according to their distance ; which proves that they recover their verdure, in proportion as their roots reach the loose mould. This holds equally true in all plants ; for Mr. Tull declares, that he does not remember ever to have seen a poor one contiguous to a well-hoed interval, unless overpowered by a too great multitude of other plants—an exception which must be equally made if it were a plant that required more or less heat or

moisture than the soil or climate afforded; and that, on the contrary, he has seen plants grow to an amazing size, when the earth around them has been frequently tilled. He mentions several instances in which the plants acquired an uncommon size from the frequency of hoeing. In short, the stirring of the earth about the plants whilst they grow, is productive of such excellent effects, that, in some parts of this country, and in many places in France, they hand-hoe their corn, particularly wheat, and find that the crops amply repay all the charge and trouble of this expensive operation: which, however, cannot be performed but in well-peopled countries. Every husbandman will immediately see how much a hoe-plough is preferable for this work, and that, to use it rightly, the corn must necessarily be planted in regular rows, as it is in the New Method of Husbandry.

It is obvious, however, that the longest-lived plants stand most in need of this culture. Perennial plants require it more than annual ones; and wheat which is sown in autumn, and does not ripen till nine months after, wants it more than spring-corn, which occupies the ground only for a few months. The former has to conquer a soil rendered hard during the course of the winter: but the other has not that difficulty to surmount; though both of them, and indeed all sorts of plants, are greatly invigorated by the repeated laying of fine fresh earth to their roots. Every farmer knows the vast efficacy of wood-land, before its native strength and vigour are exhausted; and such, in some degree, is that which this mode of cultivation furnishes; besides being constantly attended with the advantage of destroying weeds.

But these are not the only immediate benefits accruing from a due state of tillage; grubs, beetles, worms, and maggots of many different kinds, which abound in many fields, may be greatly diminished, if not entirely extirpated and destroyed, by the well-timed use of the plough, and its auxiliary instruments necessary to the reduction and due pulverization of the soil. Nothing so effectually prevents the ravages of the several tribes of subterraneous insects, as the frequent stirring and crumbling the ground.

It is also observed by an excellent farmer (Mr. Wimpey), that the saving of seed in the modern practice is very great. It is very certain, says he, from experiments most satisfactorily authenticated, that about one-third of the seed which was formerly used, and indeed is still in most places, is fully sufficient. In general it produces a better crop than the whole quantity. In the old husbandry or broad-cast method of sowing, it is usual to allow from two to three bushels of seed-wheat, as the season happens, to a statute acre; but in drilling or setting, as practised in the eastern counties, it is found that from three to five pecks is quite sufficient; so that the difference between the two modes of planting amounts at least to a saving of one bushel and a half per acre. If then these new modes of planting all sorts of grain were equally adopted, the saving, he conceives, would be an addition to the year's produce, of a tenth or twelfth of its whole amount. The farmer, therefore, who in any one year might plant one hundred acres of wheat in the new method, would save at least one hundred and fifty bushels of seed. If the savings of seed then on one hundred acres would be one hundred and fifty bushels, how amazing would be the amount of the quantity saved on all the tillage lands of Great Britain!

Mr. Duhamel observes in his *Elements of Agriculture*, that it is frequently more advantageous to increase the fertility of land by ploughing than by the use of dung. The benefit derived from the latter he considers as limited, while scarcely any bounds can be set to the utility of the former.

It is for this reason, says he, that land intended for wheat is ploughed three or four times before the grain is sowed. Some farmers, who could not dung all their lands, ploughed part of them double the usual number of times, and reaped greater crops

from these, than from those which were dunged. The expence of the ploughings extraordinary will be much less than the price of the dung necessary for the land, if the farmer is obliged to purchase it. The farmer must not however think of practising the *New Husbandry* in land which cannot be brought to a fine tilth: for as no remedies are proper for all diseases, so no one culture can suit every kind of soil. In order, says the same author, to answer the ends of this husbandry, the seeds must be distributed so sparingly, that each plant may have room to extend its roots in such manner, that they may be able to collect an abundant quantity of food; each plant must be enabled to tiller greatly, so as to produce a considerable number of stalks; and each stalk must be enabled to bear a fine long ear, well filled with grains to its very point. And to effect the first of these qualities, the field, after being thoroughly ploughed and well harrowed, must be divided by furrows, the spaces between which may be of such breadth as shall be judged most proper. In the middle of these spaces, which will be distinguished by the name of beds, the wheat, or other grain, is to be sown in one, two, or more rows. An inch will be sufficient for the distance between the grains lengthwise of the row; though that may be somewhat less, if the ground be not very good for wheat; or, on the contrary, somewhat more, if it be excellent for that grain. By this distribution, each plant will find, in the intermediate spaces between the beds, and in the beds themselves, a sufficient extent of earth wherein to collect its necessary food; for those intermediate spaces, which I shall call alleys, must be wide enough to admit of stirring the ground in them while the plants grow: but to answer the second and third intentions, it is of consequence that these stirrings be performed at proper seasons, because each of them is to produce its particular effect.

It is likewise essentially necessary that the rows of corn be sown very straight; a circumstance which, though it be attended with some trouble, ought not to discourage the husbandman, because the great difficulty will be only the first time. After the ground has been once rightly sown, it will be easy to continue in the same regular track every following year. The only precaution necessary is, that the furrows be made as straight as possible, and that care be taken to leave a proper interval between one furrow and another, if three rows are to be sown. It will be right, when convenient, also to suit the direction of the furrows to the declivity of the land, that the water may drain down to the lowest part of the field, where a ditch should be dug to carry it off: and it will also be necessary to make them lengthwise of the field, if possible, that the less ground may be lost by the space which must be left for the plough to turn in.

After the seed is put into the hoppers of the drill, the horse which draws this instrument must be made to walk slowly in the furrow first made by way of guide: and in order to drop as nearly as possible the intended quantity of seed, the outlet of the hopper must be proportioned to the size of the grain.

The distance which Mr. Tull found to produce the greatest crops was two rows upon a ridge of four feet eight inches, with ten-inch partitions.

Hoeing. This sort of tillage is performed in various ways, and by means of different instruments, which will be described.

Land which retains water should be ploughed once about October, when the weather is fine. In doing this, a furrow should be first cut in the middle of the alleys, and then it should be filled with the earth on each side, even so far as to arch it up, and leave only a small furrow on either side, close to the beds, to drain off the wet, which would prove very prejudicial to the plants if it were to remain long near their roots. This loosening of the earth will also fit it for being mellowed by the winter's frosts; to which, however, care must be taken not to expose the roots of the corn, by leaving them too bare of mould.

The most proper time for this stirring of the ground is when the plants have shot out some blades.

The second horse-hoeing, which should be given as soon as the hard frosts are past, that is to say, by the end of March, is intended to make the plants tiller; and will have this effect, if, after the earth near the rows has been stirred a little, that which was before laid up in the middle of the alleys be returned back to the furrows at their sides. This earth, having been mellowed during the winter, will afford excellent nourishment to the plants now beginning to vegetate apace, and they will soon put forth their multiplied stalks.

The third hoeing, which is the second after winter, and is intended to strengthen the stalks, should be performed when the ears of the corn begin to appear. This culture, which is looked upon as the least important of all, and is sometimes even omitted without any great inconvenience, need not be any thing more than a slight stirring of the earth, in which it will however be right to begin to hollow the alleys.

The last stirring of the earth between the rows of corn is one of the most important, being that which makes the grains swell and grow full bodied to the very point of the ear. The most proper time for this is when the ears begin to bloom: but as the corn is then high, only one furrow can be cut in the middle of the alleys, the earth of which should be laid up to the stem of the plants on each side. The plough will hardly be able to pass more than twice in this furrow, which should, however, be made as deep as possible, in order to bank up the greater quantity of earth. By this operation, the now fallow alleys are prepared for the next sowing; for it is in the middle of them that the corn is to be planted the following year; and the now eared wheat is earthed up, to prevent its being lodged; though in general corn thus cultivated is less apt to be beaten down than that which is raised in the common way, because the straw of this, being more exposed to the air, becomes harder and acquires a firmer texture, especially toward its bottom. It is for this reason that a tuft of corn, which stands quite single, is scarcely ever beaten down by the weather.

When the corn is reaped, all possible care should be taken not to trample upon the adjoining ploughed ground.

It is well known, that vigorous plants do not ripen their seeds so soon as those which have been stunted in their growth: for this reason, the corn cultivated according to the principles of the New Husbandry ripens later than in the common way, and should therefore be sown somewhat earlier. We will now suppose that the crop is reaped, and that the same field is to be sown again with wheat the next year, and every year after, as it may be, because the rows of corn are placed each time in the middle of the former alleys, which have been ploughed during the whole year, without producing any thing. Thus, the only difference between this New method and the Old Husbandry, is, that instead of resting, or fallowing, a whole field, whilst another whole field is under corn, and each of them separate from the other, the fallow here is in the same field as the corn, being interposed by means of alleys, which is the part rested between the beds, and is the part cultivated: but there is this great advantage here, that the stirring of the earth in the alleys which are not planted, not only prepares the soil admirably for being sown the next year, but invigorates the plants actually growing in the beds.

If it be thought proper to dung the alleys in order to prepare them for the reception of the seed, the dung, which should be thoroughly rotten, must be laid in the bottom of the deep furrow before made in the middle of them, and there covered with the earth which was thrown up towards the rows of wheat. If the land does not want dunging, this deep furrow is filled up without it; and this should be done immediately after harvest: that there may be time to give the ground another stirring,

which need only be a slight one, before the sowing of the rows, which are now to be in the middle of the former alleys; and the alleys of this year will be in the place of the last year's stubble.

Though land, cultivated according to the principles of the New Husbandry, does not require so much dunging as that which is managed in the old way, yet this manure will always help to enrich the soil, especially if it be used in the manner here directed. By being thoroughly rotten when it is laid in the furrow, and there covered over immediately after harvest, it will have time to mellow and diffuse its influence, and not be apt afterwards to choke up the shares of the drill.

It is obvious, says Mr. Winpey, that the improvement the soil acquires by means of frequent and well-timed tillage, must be gradual and progressive, and that the longer it is kept in tillage, if duly performed, the more fertile it becomes. He adds, that one ploughing in the beginning of winter, and a second in the winter, or early in the spring, will be more effectual in pulverizing and fertilizing the soil than half a dozen at any other time of the year.

This improvement in tillage, says he, is so very clear and certain, that it surprises one much that it is not universally practised. He therefore concludes, that these improvements in tillage may be considered of the greatest importance, as forming the basis or foundation on which the successful introduction of the several new articles of field culture depend.

SECT. II. *Of the Instruments of Husbandry.*

FROM what has been observed in the preceding section, it will be evident that all kinds of lands are not capable of receiving the New Husbandry; consequently, in the description of implements, it will be necessary to give an account of those which are most advantageously useful both in the old and new method of cultivating the ground.

Various instruments are employed in these different kinds of husbandry, such as ploughs, harrows, rollers, horse and hand hoes, drill machines, &c. which are still more diversified by various modifications and constructions, in order to adapt them to particular purposes. Ploughs are probably not yet arrived at that degree of perfection of which they are capable; they have however lately been very much improved. Formerly, Mr. Winpey justly observes, some of them little more than scratched the ground; others were made so heavy and clumsy as to require great strength to work them; but that at present there are several in use which perform much better. Of the last description are the *Rotherham*, the *One-wheeled*, the *Norfolk*, and the *Double* ploughs. And of those which have been contrived for particular uses, that with two mould boards is highly useful. With this plough the open furrows for potatoes may be conveniently made, and the sets be afterwards completely covered by splitting the ridges. And when they have been horse-hoed, it again splits the ridges in the intervals, and earths up the plants. It effectually answers the same purpose in all broad drilled crops where the horse-hoe is used, and with half the labour performs the same work as could be done with the common plough, and in half the time which that instrument requires.

The *Miner* is a kind of plough which has lately been much employed in the cultivation of arable land in Lancashire, and is highly useful in opening the soil to such depths as may be thought necessary. It is made very strong, with a share only without any mould board, for the purpose of raising the earth; it therefore loosens without turning up the soil, an operation which is performed still more effectually if two shares or coulter be added. In practice, it is made to follow the common plough in the same furrow, so as to penetrate to a considerable depth below the bottom of it. Doctor Anderson considers it as an extremely useful implement in lands that are capable of admitting it to work, and which no farmer should be without.

Common Plough. This is a plough which is much in use in the North of England and in Scotland, and which answers all common purposes tolerably well, especially the breaking up of stiff and rough land, where stones abound and hard strong clayey soils. It is represented at Pl. 13, fig. 1. The great length of its head gives it a pretty firm hold of the ground, while its weight prevents it from being thrown out by any obstructing substance; the length of the handles also gives the ploughman great command over it, and by the length of its mould-board it lays the furrow-slice well over.

The *Chain Plough*, Pl. 13, fig. 2. is likewise much in use in the Northern parts of the kingdom. From the shortness of its head and mould-board, friction is considerably lessened, being only thirty inches from the point of the sock to the hind part of the head, and about eight feet from the point of the beam to the end of the handles. The sock and mould-board form a gently curving line, which prevents the gathering of earth. It is calculated so as to make a wide furrow without leaving any part unfurrowed. It is termed the Chain Plough, from its being drawn by an iron chain fixed to the back part of the beam just before the coulter. This produces two advantages; which are, that by means of a muzzle it makes the plough go deeper or shallower, and causes less stress on the beam than if it were fixed at the end. This plough is proper for loams, coarse clays, and those tender soils which are free from stones. It may also be employed for opening up pasture grounds, which have formerly been well cultivated.

Another chain-plough of smaller dimensions than common, and which is drawn by one horse, may be employed very advantageously for horse-hoeing where the land is mellow, which it ought always to be for this process. It is sufficient for making furrows to receive the dung, for ploughing the drills after dunging, and for hoeing the crop. A still smaller plough of the same kind may be recommended also for a kitchen-garden. It can be reduced to the smallest size, by being made of iron; and where the land is properly dressed for a kitchen-garden, an iron plough of the smallest size drawn by a horse will save much spade-work. Nor is this the only case where a single-horse plough may be profitably employed. It is sufficient for seed-furrowing barley, where the land is light and well-dressed; and it may be used in the second or third ploughing of fallow, to encourage annual weeds, which are destroyed in subsequent ploughings.

The *Rotterdam Plough*, Pl. 13, fig. 3. is a machine of very simple construction, and easily worked. AB is the beam, CD the sheath, EBD the main handle, FR the smaller handle, GH the coulter, KI the sock or share, NP the bridle, S the fly-band, and ML a piece of wood in place of a head. The difference between this and the common plough seems to consist in the bridle at the end of the beam, by which the ploughman can give the plough more or less land by notches at N, or make it cut deeper or shallower by the holes at P; in the coulter or share, which is so made and set as to cut off the new furrow without tearing; and in the mould-board, which is so shaped as first to raise a little, and then gradually turn over the new cut furrow with very little resistance. But the greatest advantage attending it, is its being so easy of draught, that it will do double the work of any common plough. An improved plough of this kind has lately been invented by Mr. Cook.

The *Paring Plough*, Pl. 13, fig. 4. is an instrument used in several parts of this country for paring off the surface of the ground, in order to its being burned, &c. From A to A is the plough-beam, about 7 feet long, mortised and pinioned into the block B. CC are the sheaths or standards, made flat on the inside, to close equally with the paring plate, and fastened to it with a bolt and key on each side, as at D. E is the paring plate of iron laid with steel, about four inches wide, and from

12 to 18 inches long. FF are two iron braces to keep the standards from giving way. GG are the plough handles, which must be fixed slope-ways between the beam and the standards. The use of the pin-holes in the beam, is to make this plough cut more or less deep, by fixing the wheels nearer to or farther from the paring plate.

The *Four-coultered Plough* is represented at Pl. 14, fig. 13. Its beam is ten feet four inches long, whereas that of the common plough is but eight. The beam is straight in some common ploughs, but in this it is first straight, and then arched. It is thus contrived to avoid the too great length of the three foremost coulters, which, if the beam were straight all the way, would bend and be displaced, unless they were very heavy and clumsy. The sheath in this plough should be seven inches broad. The fixing of the share in this, as well as in the common plough, is the nicest part, and requires the utmost art of the maker; for the well-going of the plough wholly depends upon it. Another matter of importance is the placing the four coulters; which must be so set, that their four edges, as the plough moves forward, may be all parallel to each other, or very nearly so; for if any one of them should much incline to, or recede from, either of the other, then they would not enter the ground together. The coulter is two feet eight inches long before it is worn; the handle takes up sixteen inches of this length, which is allowed in order that the coulter may be driven down as the point wears away. As to the wheels, the left-hand wheel is 20 inches diameter, and that on the right 2 feet 3 inches; and the distance at which they are set from each other, is 2 feet 5½ inches.

The *Patent Sward-cutter*. The different parts of this machine are represented by N° 1. 2. 3. of Pl. 13, fig. 5. AA, &c. is a square frame 3 feet 4 inches from the fore to the hind part, by 4 feet 3 inches, the breadth of the machine within side; the timber (when of fir) 4 inches square, placed on two wheels BB, 3 feet diameter. CC, &c. are six strong pieces of wood, called *bulls*, 3 feet long, 5 inches and a half broad, the thickness 6 inches at E, and tapering to 3 inches at F. Into these are fixed the cutting wheels, which are iron, 13 inches diameter, ¾ths of an inch thick at the centre, about an inch diameter for piercing holes to fix the iron axles in; from that they are to be of such thickness as will allow the edges to be well steeled. The wheels are fixed by two bolts going through the bulls. GG, &c. are hollow pieces of wood, called *thorles*, each 3½ inches long, which inclose the bolt M. M. and keep the bulls CC, &c. at their proper distances, but may be made longer or shorter at pleasure, according as the sward requires to be cut in larger or smaller pieces. The iron bolt MM goes through two pieces of wood or iron, PP, 7 inches long, clear of the wood, supported by iron stays fixed to the frame, and through all the bulls. HH, N° 2. and 3. a cylinder or segment of wood, 7 inches diameter, called a *rocking tree*, which goes across the frame, and moves on the pivots fixed into it, one at each end, supported by an iron bolt or piece of wood mortised into the frame, 8 inches high, as appears in N° 2. and 3. to which 6 chains or ropes are fixed by hooks, at different distances, as you want your cuts, 9, 8, 7, or 6 inches from one another, and are joined to the end of each bull in which the cutting wheels run; so that when the rocking tree is turned about by the lever I, fixed in the middle of it, all the bulls, with their cutting wheels, are raised out of the ground at once, as in N° 3. by which means the machine may be turned without any danger of straining the wheels. LLL, &c. N° 1. 2. 3. are weights of freestone, 26 inches long and 6 inches broad; the under one 4 inches thick, the upper one 3 inches thick; weighing about 64lb. the under, and 48 the upper; each of them having two holes, through which iron spikes, firmly fixed in the bulls, pass, in order to keep them steady. When the ground is easily cut, the under stone may answer; when more difficult, the other stone may be added; so that every

wheel may have 7 stone weight upon it, which has been found sufficient for the stiffest land and toughest sward the machine has ever been tried on. Weights will answer fully better, but are more expensive. The lever I, N^o 2. 3. which ought to be 5 feet long, must have a sliding rope on it, fixed to the back part of the frame; so that when the cutting wheels are all taken out of the ground three or four inches, by the rocking tree's being turned partly round by the lever, the rope may be fixed to it by a loop over the pin R, N^o 3. Thus all the cutting wheels are kept out of the ground till the machine is turned; and then by moving the loop off the pin, it slips back towards the frame, and the lever is gently let back to its place, as in N^o 2. by which the cutting wheels are put into their former posture, by the weights fixed on the bulls in which they run. PP, N^o 1. a small bolt of iron, with a hook on one end of it, to strengthen the bolt MM, to be hooked on the centre of it, and joined to the frame by a nut and screw. For a single-horse sward-cutter (which has only four cutting wheels), a pair of shafts are used, and may make the two sides of the frame without any joinings. The width of the frame, in proportion to the double-horse sward-cutter, is as four to six.

The original intention of this machine was to prepare old grass-ground for the plough, by cutting it across the ridges, in the beginning of or during winter, when the ground is soft, in order to answer all the purposes designed by the four-coultered plough, so strongly recommended for bringing into tilth grass ground that has been long rested. This the sward-cutter has been found to do much more effectually and expeditiously: for the machine just mentioned cuts the sward in the same direction with the plough; and is liable, from every obstruction the coulter meet with, to be broken or thrown out of its work altogether; to which the sward-cutter consisting of four, six, or more cutting wheels is never liable, from these being entirely independent of one another, cutting the ground across the ridges before ploughing, and rendering that operation easier to two horses than it would otherwise be to three. The furrow being cut across, falls finely from the plough in squares of any size, not under six inches, in place of long slips of tough sward seldom and imperfectly broken by the four-coultered plough.

This instrument is very fit for preparing ground for burn-beating, as it will save much hand-labour. It may also be properly used in cross-cutting clover of one or two years standing, to prepare the ground for wheat, if the land is stiff and moist enough. It may be applied to cutting and cross cutting pasture ground, intended to have manure of any kind put upon it to meliorate the grass: and in this it will far exceed the scarificator mentioned in one of Mr. Young's tours. In preparing for barley, it excels a roller of any kind in reducing the large hard clods in clay land, occasioned by a sudden drought, after its being ploughed too wet; and it is likewise very proper for reducing such clay land when under a summer-fallow. In this operation, the sward-cutter is greatly preferable to the cutting roller, likewise mentioned by Mr. Young; for the wheels of the latter being all dependent one on another, when one is thrown out by a stone, three or four must share the same fate. Besides, the cutting roller has but seven wheels in six feet; whereas the sward cutter has six in four feet three inches, at nine inches distance; and, if necessary, may have them so near as six inches.

Two horses are sufficient for the draught of a double-horse sward-cutter, and one horse for a single-horse one. One man manages the machine and drives the horses. He begins his operation by first measuring off 20 or 30 paces from the machine, and there fixing a pole. He then cuts the field across, as near at right angles with the ridges as he can. When the cutting wheels are past the last furrow about a yard or so, and the machine is upon the outmost ridge of the field on which it

must turn, he must stop the horses; then take hold of the lever I, N^o 2. and by pulling it to him he raises the cutting-wheels out of the ground, which are kept so by the loop of the rope being put over the pin R, in the lever I, N^o 3. till the machine is turned and brought to its proper place, which is done by measuring off the same distance formerly done on the opposite side of the field. When the cutting-wheels are exactly over the outmost furrow, then, on the horses being stopped, the rope is slipped off the pin R, and the lever returned to its former place, as represented N^o 2. which allows the weights LL, &c. to force the cutting wheels into the ground again. He then goes on till the interval betwixt the first and second stroke of the machine is all cut, and in this manner the field is to be finished.

One sward-cutter will cut as much in one day as six ploughs can plough. The land may lie several months in winter after being sward-cut, when there is no vegetation to make the cuts grow together again before it is ploughed; but the sooner it is ploughed after cutting the better, that it may have the benefit of all the winter's frost, which makes it harrow better at seed-time.

Any common wright and smith may make this machine. It is very strong, and simple, easily managed and moved from place to place; and costs only about 5l. or 6l.

Harrows. These instruments are commonly considered as of no use but to cover the seed; but they have another use scarcely less essential, which is to prepare land for the seed. This is a circumstance of importance for producing a good crop; but the imperfect way in which these purposes are answered by the common harrow, render it a matter of importance to enquire into the merits of other inventions of the same sort.

Brake-Harrow. This is a large and weighty harrow, the purpose of which is to reduce a stubborn soil, where an ordinary harrow makes little impression. It consists of four square bulls, each side five inches, and six feet and a half in length. The teeth are 17 inches long, bending forward like a coulter. Four of them are inserted into each bull, fixed above with a screw-nut, having 12 inches free below, with a heel close to the under part of the bull, to prevent them from being pushed back by stones.

This instrument may be of advantage in the following strong clay that requires frequent ploughings. A brakeing between every ploughing will pulverize the soil, and render the subsequent ploughings more easy. In the month of March or April, when strong ground is ploughed for barley, especially if bound with couch-grass, a cross-brakeing is preferable to a cross-ploughing, and is done at half the expence. When ground is ploughed from the state of nature, and after a competent time is cross-ploughed, the brake is applied with great success, immediately after the cross ploughing, to reduce the whole to proper tilth.

A little reflection, however, even without experience, will make it evident, that the same harrows, whatever be their form, can never answer all the different purposes of harrowing, nor can operate equally in all soils. The following, therefore, of three different forms are adapted for different purposes, but equal perhaps to all that is designed from the use of such an implement. They are all of the same weight, drawn each by two horses. Birch is the best wood for them, because it is cheap, and not apt to split.

First Harrow, Pl. 13. fig. 6. is composed of four bulls, each four feet ten inches long, three and a quarter inches broad, and three and a half deep; the interval between the bulls 11 and three-fourths inches; so that the breadth of the whole harrow is four feet. The bulls are connected by four sheaths, which go through each bull, and are fixed by timber nails driven through both. In each bull five teeth are inserted, ten inches free under the bull, and ten inches asunder. They are of the same form with those of the brake, and inserted into the wood in the same man-

ner. Each of these teeth is three pounds weight; and where the harrow is made of birch, the weight of the whole is 6 stone 14 pounds Dutch.

The *Second Harrow*, Pl. 13. fig. 7. consists of two parts, connected together by a crank or hinge in the middle, and two chains of equal length, one at each end, which keep the two parts always parallel, and at the same distance from each other. The crank is so contrived, as to allow the two parts to ply to the ground like two unconnected harrows; but neither of them to rise above the other, more than if they were a single harrow without a joint. In a word, they may form an angle downward, but not upward. Thus they have the effect of two harrows in curved ground, and of one weighty harrow in a plain.

The *Third Harrow*, Pl. 13. fig. 8. consists also of two parts, connected together like that last mentioned. It has eight bulls, each four feet long, two and a half inches broad, and three deep. The interval between the bulls is eight inches; and the breadth of the whole harrow, including the length of the crank, is six feet four inches. In each bull are inserted five teeth, seven inches free under the wood, and ten and a half inches asunder, each tooth weighing one pound. The rest as in the foregoing harrows.

These harrows are a considerable improvement. They ply to curved ground like two unconnected harrows; and when drawn in one plain, they are in effect one harrow of double weight, which makes the teeth pierce deep into the ground. The imperfection of common harrows, known to almost every farmer, will suggest the advantages of this set of harrows. The first is proper for land that has long lain after ploughing, as where oats are sown on a winter furrow, and in general for harrowing stiff land: it pierces deep into the soil by its long teeth, and divides it minutely. The second is intended for covering the seed: its long teeth lay the seed deeper than the common harrow can do; which is no slight advantage. Seed slightly covered by the common harrows wants moisture, and is burnt up by the sun; beside, that a proportion of it is left upon the surface uncovered. The third harrow supplies what may be deficient in the second, by smoothing the surface, and covering the seed more accurately. The three harrows make the ground finer and finer, as heckles do lint; or, to use a different comparison, the first harrow makes the bed, the second lays the feed in it, the third smooths the clothes. They are contrived in fact to answer an established principle in agriculture, That fertility depends greatly on pulverizing the soil, and on an intimate mixture of manure with it, whether dung, lime, marle, or any other.

Chain and Screw Harrow. But in addition to these, in Pl. 13. fig. 9. is a harrow, to which this name is given. Its properties are, that if your ridges be high, and you wish to harrow them from one end to the other; by lengthening the chain (which the screw commands), the harrow, when drawn along, forms an angle downwards, and misses none of the curve of the ridge, so far as it extends (which may be nine feet, the distance from A to B. The extent, in the contrary direction, is five feet six inches). When the crowns of the ridges have got what is thought sufficient harrowing lengthwise, you shorten the chain by the screw, which forms an angle upwards: the harrow is then drawn by the horses, one on each side of the furrow; which completely harrows it, and the sides of the ridge, if 18 feet broad. When you want to harrow even ground or high ridges across with the screw, you can bring the harrow to be horizontal, so as to work as a solid harrow without a joint.

The teeth are formed and fixed in the common manner, square, not in the fashion of counters; and are nine or ten inches below the wood, and of such strength as is required. The figures 1, 2, &c. point out where the 12 teeth on each side of the harrow are placed. Where a strong-brake harrow is not necessary, by making the teeth shorter and lighter, you

may have 48 teeth, which will tear the ground at every two inches, cover the seed well, and make a fine mould. It is recommended, that harrows for every purpose, and of any size, be made on the above principle; by which no tooth can ever follow the track of another, and all of them will be kept constantly acting.

Many inconveniences have however been found to attend the use of harrows, even when constructed on these improved plans; therefore Mr. Knight has been induced to form one upon a very different principle. It is made with wheels and an axle tree, by which means it performs its work with much greater ease to the horses, and the too great stress on its fore-part as well as its liability to be choked up is prevented.

Knight's Harrow. This harrow is constructed with two joints AA in the axle-tree, Pl. 16. fig. 3. one of which is covered, as when the harrows are at work, the other uncovered, to shew the construction of the joint; and two joints, aa, in the front of the bar; by means of which the pliability of the tree, and that of the bar, humours the wheels, and keeps them in their proper directions in the furrow; and, requiring very little scope of ground, the turnings are rendered very convenient and easy.

If, in the course of working the land, a farmer varies in the breadth of his furrows, it is contrived, in order to make the harrow narrower, that part of the bar B, which is fastened by two pins bb, may be taken off when requisite; part of the axle-tree, and part of the hind-bar C, both which are fastened by the iron bolt D, are also to be removed; and the remaining outward parts to be joined and fastened by one of the two pins in the bar, and by a shorter bolt d, shewn separate, and intended for the axle-tree and hind-bar.

If the farmer should work two horses which are unequal in height, the horizontal direction, or evenness of the joints, may be destroyed in some degree: to remedy and supply this deficiency in the horses, the whipple-tree E, is made to be heightened or lowered by means of notches e, shewn separate, to which it is connected by a ring. In light barley-lands, when you accommodate your harrow for one horse, by narrowing it as before directed, there are two strings conveyed by two rings from the axle-tree, through two loops ff, under the front bar. The wheel F, under the hind-bar, which is shewn enlarged and separate in the plate, will support the bar; and, by this assistance, the harrow is conveyed to the field on the axle-tree bar, as a substitute for a sledge: there are also two wooden pegs gg, by which the harrows, when turned upon the carriage, are secured.

Should it be objected, that the harrow will prove expensive on account of the iron, an axle-tree and joints may be readily constructed in wood, upon the same principles as shewn in the plate separate at G; though preference should be given to iron. If the wheel under the hind-bars should not be adopted, there is a slider H, shewn separate, which works with a pin, and, when not wanted, is turned and fastened under the axle-tree.

As it is found by experience to be very useful to heighten or lower the harrows occasionally, particularly on broad lands rising in the middle; where of course the middle harrow takes most hold, and generally requires the least; this may be easily effected, by fixing irons, with notches, like those on the fore-bar, by which the whipple-trees are supported, on the hind-bar, instead of the hooks, and putting the hooks on those irons.

The *Fallow-cleansing Machine* is intended for cleansing fallows from weeds, &c. AA, Pl. 13. fig. 10. is the frame; B the first, C the second roller; in which last are two cranks to move the arms DD, which work the rake up the directors fixed on the plank E. The under side of the lower ends or shares of these directors are sharp, to cut the clods and let them come on the upper side. Each alternate heel of the share is longer than

the intermediate one, that they may not have more than one-half to cut at once. At the back of the plank E are two screws to let it loose, that the directors may be set higher or lower. The shares are to penetrate the ground two or three inches, to raise the quicks till the rake II fetches them into the cart H, where a man must be ready with a muck-hook to clear them backward when gathered. In the rake I are two teeth for every space of the directors, that stones, &c. may be gathered without damage. At KK are two staples, by which the machine is drawn: under them at b are two hooks, placed low to raise the machine in turning, by the help of the traces; and the axle-tree of the cart should be fixed upon a pin, that it may turn like a waggon. FF are the triggers to throw the rake behind the roots. The long teeth at GG are to cleanse the roller C. II is the rake which gathers up the weeds into the cart H, and is drawn above the trigger I' by the working of the arms D, expressed by the dotted lines at dd, iii. The triggers F, of which there is one on each side, move on the pivots a; so that when the points b of the rake I have been drawn up by the directors E to the part marked c, the trigger, giving way, permits the rake to pass; but immediately falling, the rake returns along the upper surface of the trigger marked ee, and of course falls on the weeds when it comes to the end, a little beyond the pivot a. The reader will observe, that the boarding is taken away on one side, in the Plate, in order to give a more perfect view of the inner parts of the machine.

Universal Sowing Machine. This, whether worked by hand, drawn by a horse, or fixed to a plough, and used with it, is extremely simple in the construction. It will sow wheat, barley, oats, rye, clover, cole-seed, hemp, flax, canary, rape, turnip, besides a great variety of other kinds of grain and seeds, broadcast, with great accuracy. It is equally useful in the new husbandry, particularly when fixed to a plough; it will then drill a more extensive variety of grain, pulse, and seed, through every gradation, with regard to quantity, and deliver each kind with greater regularity than any drill plough whatever. When used in this manner, it will likewise suit farmers who are partial to the old husbandry, as it will not only sow in the broadcast way with the most singular exactness, but save the expence of a seedsmen; the seed being sown either over or under furrow at pleasure, and the land ploughed by the same operation.

Perhaps a fair and decisive experiment for ascertaining the comparative merits of broadcast or drilling any particular crop, was never before rendered so practicable as by this machine; since the seed may now be put in with the utmost degree of regularity, in both methods of culture, by the same movement; and without this it is perhaps impossible to make a just decision.

The advantages of this machine consist in its spreading any given quantity of seed over any given number of acres with a mathematical exactness, which cannot be done by hand; and by which great saving may be made in seeding the ground, as well as benefiting the expected crop. It will likewise broadcast beans, pease, and tares, or drill them with the greatest exactness, particularly when constructed to be used with a plough. And these advantages are accompanied with another, viz. that the wind can have no effect on the falling of the seed.

Of the Machine when used without a plough, and drawn by a horse. It may in this case be made of different lengths, at the desire of the purchaser. The upper part AAAA, Pl. 14. fig. 2. contains the hoppers from which the grain or seed descends into the spouts. The several spouts all rest upon a bar, which hangs and plays freely by two diagonal supporters BB; a trigger fixed to this bar bears a catch wheel: this being fixed on the axle, occasions a regular and continual motion, or jogging of the spouts, quicker or slower in proportion to the pace the person

sowing with it drives; and of course, if he quickens his pace, the bar will receive a greater number of strokes from the catch-wheel, and the grain or seed will feed the faster. At the bottom of the machine is placed an apron or shelf in a sloping position, and the seed, by falling thereon from the spouts above, is scattered about in every direction under the machine, and covers the ground in a most regular and uniform manner. To sow the corn or seed in drills, there are moveable spouts (see fig. 3.), which are fixed on or taken off at pleasure, to direct the seed from the upper spout to the bottom of the furrow.

The machine is regulated for sowing any particular quantity of seed on an acre by a brass slider, A, fig. 4. fixed by screws against a brass bridge on each of the spouts. The machine is prevented from seeding while turning at the ends, by only removing the lever E, fig. 5. out of the channel G, to another at H, on the right hand of it, which carries back the bar from the catch wheel, and occasions the motion of the spouts to cease, and at the same time brings them upon a level by the action of the diagonal supporters; so that no corn or seed can fall from them. The machine in this form is particularly useful for broadcast sowing clover upon barley or wheat; or for sowing any other kind of seed, where it is necessary that the land should first be harrowed exceedingly fine and even.

This machine, when used, must be placed about two feet from the ends of the furrows where you intend it shall begin to sow. Fill the hoppers with seed, and drive it forwards with the outside wheel in the first furrow. When you are at the end of the length, at the opposite side of the field, lift the lever E, fig. 2. into the channel H, and the machine will instantly stop sowing. Drive it on about two feet, and then turn. Fill the hoppers again if necessary; then remove the lever back again into the channel G, and in returning, let the outside wheel of the machine go one furrow within the track which was made by it, in passing from the opposite end.

Method of regulating the Machine. There is fixed in each spout a bridge (see fig. 4.), with an aperture B, for the grain or seed to pass through. This aperture is enlarged or contracted by a slider A, which passes over it; and when properly fixed for the quantity of seed designed to be sown on an acre, is fastened by means of two strong screws firmly against the bridge. This is made use of in sowing all kinds of seed, where it is required to sow from one bushel upwards on an acre. To sow one, two, three gallons, or any of the intermediate quantities, as of clover, cole-seed, &c. the brass plate, fig. 5. is placed between the bridge and the slider, with the largest aperture B downwards, which aperture is enlarged or contracted by the slider as before. To sow turnips, the same plate is placed between the bridge and the slider, with its smallest aperture A downwards, and the hollow part about the same aperture inwards.

A view of the regulator is had at fig. 6. by which the apertures in the several spouts are all set exactly alike, with the utmost ease, to make them seed equally. The extreme height of the largest aperture is equal to the breadth AB, and the breadth at C is equal to the height of the smallest aperture used, viz. that for turnips. The side AC is divided into 60 equal parts, and on it moves the slider or horse D; which being placed at any particular degree, according to the quantity of seed required to be sown on an acre, is fixed upon it, by a screw on the side of the slider or horse. When this is done, the end of the regulator is put through the aperture in the bridge or plate (whichever is intended to be used), and the slider against the bridge in the spout, raised by it, till it stops against the horse on the regulator; then the slider is fastened against the bridge firmly by the two screws, care being taken at the same time that it stands nearly square. Thus the spouts, being all fixed in the same manner, will seed equally.

It is easy to conceive that the size of the apertures, and con-

frequently the quantity of seed to be sown on an acre, may be regulated with a far greater accuracy than is required in common practice.

The spouts may be regulated with the utmost nicety, in five minutes, to sow each particular seed for the whole season. But a little practice will enable any person, who possesses but a very moderate capacity, to make the spouts feed equally, even without using the regulator.

Of the Machine, when made to be used by hand. The chief difference in this case is, that it is made lighter, with but three spouts, without shafts, and is driven forwards by the handles. It has also a bolt in front, which being pushed in by the thumb, releases the machine; so that it can then easily be placed in a perpendicular position. This alteration is necessary to keep the handles of a convenient height, in sowing up and down a hill, where the slope is considerable; and is done while the machine is turning at the end of the length. The method of regulating and using it is the same as when made to be drawn by a horse.

Of the Machine, when formed so as to be used with a plough. This is seen at fig. 1. pl. 14. and is, without doubt, the most useful application of the machine; it can be fixed without difficulty to any kind of plough, in the same manner as here represented. The advantages arising from its use are considerable; for, besides the increase in the crop, which will be insured by the seeds being broad-cast with a mathematical nicety, a large proportion of seed (the value of which alone, in a few months, will amount to more than the price of the machine) and the seedman's labour will be saved. The seed may likewise be sown either under or over furrow; or one cast each way, as is practised by some farmers. The seed also, being cast by the machine upon the fresh ploughed land, may be immediately harrowed in, before the mould has lost any part of its moisture; which in a dry season will greatly promote the crop. In drilling any kind of grain, pulse, or seed, it possesses every property that can be wished for in the best drill-plough, nor will it (as most of them do) bruise the seed, or feed irregularly. The construction of the machine is nearly the same as the large ones.

To prepare it for drilling, instead of the apron, place the long spout, fig. 3. upon the brackets, on the front of the machine, by the ears AA, to receive the seed from the upper spout, and fasten the lower end of it, by a small cord, to that hook upon which the apron is hung for broad-casting, which is next the plough (see fig. 7.); the seed will then be directed by the long spout, to the centre of the furrow, near the heel of the plough. The spring for correcting the strength of the stroke, is necessary only when they are required to go along the side of a considerable declivity. The machine, when fixed to a plough, does not require the smallest degree of skill in using, as nothing is necessary but to keep the hopper filled, which will contain a sufficient quantity of seed to go upwards of 140 rods before it will want re-filling, when three bushels and a half are sown on an acre. The accuracy with which it will broad-cast, may in some measure be conceived, by considering that the seed regularly descends upon the apron or shelf, and is from thence scattered upon the ground, in quantity exactly proportioned to the speed of the plough: also that each cast spreads to the third furrow; and by this means shuts upon the last. In this manner it is continually filling up till the whole field is completely covered; so that it is impossible to leave the smallest space without its proper quantity of seed. When the plough is wanted for any other purpose, the machine, with the wheel at the heel of the plough for giving it motion, can be removed or replaced at any time in a few minutes.

At fig. 11. pl. 14. the machine is represented fixed to a double furrow creasing plough, as prepared for drilling. When thus connected, it is made with two upper and two long spouts for drill-

ling, two aprons for broad-casting, and with a double hopper; but in other respects the same as when intended for a single furrow plough: it is used in all cases with the greatest ease imaginable. The interval between the points of the two shares of a creasing plough is usually ten inches; the beam about nine feet long; and the whole made of a light construction.

A full explanation of all the figures. In Pl. 14. fig. 1. the machine is fixed to a Kentish turn wrest plough. A the machine. B the apron upon which the seed falls and rebounds upon the land, in broad-casting. C lid to cover the hopper. D wheel at the heel of the plough. E strap. FF hooks upon which the apron turns by a pivot on each side. G stay to keep the machine steady. H lever to prevent it from sowing.

Fig. 2. The machine constructed to be drawn by a horse. AAAA the hoppers. BB the diagonal supporters. CCCC the upper spouts. D the apron or shelf upon which the seed falls from the upper spouts. E the lever, which carries back the bar, and prevents the machine from sowing. FF staples upon the handles, through which the reins pass, for the man who conducts the machine to direct the horse by. I, screw, to fix the machine occasionally. N. R. The knobs (by turning which each particular spout may be taken from off the bar, and thereby prevented from feeding) are over each upper spout; but, to prevent confusion, are not lettered in the Plate.

Fig. 3. The long spout. AA the ears by which it hangs.

Fig. 4. The bridge, fixed in the upper spouts. A the slider, which contracts or enlarges the different apertures. B the aperture in the bridge, through which the seed passes, when sowing any quantity from one bushel upwards on an acre.

Fig. 5. The plate which is placed between the bridge and the slider, for sowing small seeds: the aperture A being downwards for sowing turnips; the larger one B downwards for sowing clover, &c.

Fig. 6. The regulator, made of brass. D the slider or horse which moves upon it, and is fixed at any particular degree by a screw in its side.

Fig. 7. Is the same machine with that in fig. 1. The dotted lines, expressing the situation of the long spout, when the apron is removed, and the machine adapted for drilling.

Fig. 8. Also the same machine, with the front laid open to show the inside. A the catch-wheel fixed upon the axle. BB the axle upon which the machine hangs between the handles of the plough. C the pulley, by which the strap from the wheel at the heel of the plough turns the catch-wheel. D the bar upon which the upper spout rests, suspended by the diagonal supporters EE, bearing against the catch-wheel by the trigger F, and thereby kept in motion while the plough is going. G the apron in a sloping position, upon which the corn or seed falls from the upper spout, and is scattered by rebounding upon the land. It turns upon pivots, and by this means throws the seed either towards the right hand or left at pleasure.

Fig. 9. The upper spout.

Fig. 10. represents the movement in the machine fig. 2. AAAA cleets between which the upper spouts rest. BB the diagonal supporters, by which the bar with the upper spouts hang. C the catch-wheel. DD the axle. E the trigger upon the bar which bears against the catch-wheel. FF stays from the back of the machine by which the bar plays.

The Roller. This implement is of great use in husbandry, though scarcely known in ordinary practice; or, where introduced, it is commonly so slight as to prove very insufficient. Rollers are made of stone, cast iron, or wood, and each has its advantages; but that of wood should be constructed in the following manner. From the body of a tree, six feet ten inches long, make a cylinder. Surround this with three rows of filices, one in the middle, and one at each end. Line these filices with planks of wood equally long with the roller, and so narrow

as to ply into a circle. Bind them fast together with iron rings. The roller, thus mounted, ought to have a diameter of three feet ten inches. It has a double pair of shafts for two horses abreast, and those are sufficient in level ground; though four may be necessary. The roller without the shafts ought to weigh 200 stone Dutch; and its large diameter makes it by no means difficult in the draught.

The *Spike Roller* is a very useful instrument for many purposes in husbandry. It is constructed nearly in the manner of the common roller, except its having the addition of a great number of spikes. It is represented in Pl. 14. fig. 12.

Rolling wheat in the month of April is very important in a loose soil; as the winter rains leave many roots exposed to the air. Barley ought to be rolled immediately, especially where grass-seeds are sown with it. In a gravelly soil, the mould should be so dry as to bear the roller without clinging to it. A clay soil ought neither to be tilled, harrowed, nor rolled, till the field be perfectly dry. There is the greater reason for this precaution, because much rain immediately after rolling is apt to cake the surface when drought follows. Oats in a light soil may be rolled immediately after the seed is sown, unless the ground be too wet. In a clay soil, delay rolling till the grain be above ground. The proper time for sowing grass-seeds in an oat-field, is when the grain is three inches high; and rolling should immediately succeed, whatever the soil be. Flax ought invariably to be rolled immediately after sowing. The first year's crop of sown grasses ought to be rolled as early the next spring as the ground will bear the horses. It fixes all the roots precisely as in the case of wheat. Rolling the second and third crops in a loose soil is useful; though not so essential as rolling the first crop.

Rolling encourages the growth of plants, by bringing the earth close to their roots. It also keeps in the moisture, which is sometimes of great moment. And lastly, besides the foregoing advantages, it facilitates the mowing for hay; and it is to be hoped, the advantage of this practice will induce farmers to mow their corn also, which will increase the quantity of straw both for food and for the dunghill.

There is a small roller for breaking clods in land intended for barley. The common way is, to break clods with a mull; which requires many hands. This the roller does more effectually, and at much less expence. Let a harrowing first break the clods a little; and after lying a day to dry, this roller will reduce them to powder. This however does not supersede the use of the great roller, to make the soil compact, and keep out the summer-drought. A stone-roller four feet long and fifteen inches diameter, drawn by one horse, as a preparation for barley, is gaining ground daily; but in a clay soil, the clods are sometimes too firm, or too tough, for so light a machine. In that case, a roller of the same size, but of a different construction, is necessary. It ought to be surrounded with circles of iron, six inches asunder, and seven inches deep; which will cut even the most stubborn clods, and reduce them to powder.

Explanation of the instruments commonly employed in the new husbandry. In Pl. 15. fig. 1. is represented a *marking-plough*. The chief use of this plough is to straighten and regulate the ridges. The first line is traced by the eye, by means of three poles placed in a straight line. The plough draws the first furrow in the direction of this line; and, at the same time, with the tooth A, fixed in the block of wood near the end of the cross-pole or slider BB, marks the breadth of the ridge at the distance intended. The ploughman then traces the second line or ruit made by the tooth, and draws a small furrow along it; and continues in this manner till the whole field is laid out in straight and equidistant ridges.

A *plough* for the purpose of breaking up ley, or turning up the bottom of land when greatly exhausted, is seen at Pl. 15.

fig. 2. By the particular construction of this instrument, the width and depth of the furrows can be regulated to a greater certainty than by any other hitherto discovered. It appears heavy, but two horses are sufficient to plough with it in ordinary free land; and four are only necessary in the stiffest clay-soils. It is likewise easily held and tempered. A is the sword fixed in the fizers B, which runs through a mortise E, at the end of the beam C, and regulates the depth of the furrow by raising or depressing the beam; it is fixed by putting the pin D through the beam and sword, and is moveable at E.

A *jointed Brake-harrow*, with 24 teeth, shaped like coulter, and standing at about an angle of 80 degrees, is represented at Fig. 3. pl. 15. By this instrument the land is finely pulverized, and prepared for receiving the seed from the drill. It requires four horses in stiff, and two in open, land. This harrow is likewise used for levelling the ridges; which is done by pressing it down by the handles where the ridge is high, and raising it up when low.

Fig. 4. pl. 15. is an *angular Weeding-harrow*, which may follow the brake when necessary. The seven hindmost teeth should stand at a more acute angle than the rest, in order to collect the weeds, which the holder can drop at pleasure, by raising the hinder part, which is fixed to the body of the harrow by two joints.

Fig. 5. pl. 15. exhibits a *pair of barrows with shafts*. This harrow is used for covering the seed in the drills, the horse going in the furrow.

At Fig. 6. pl. 15. is seen a *Drill-plough*, constructed in such a manner as to sow at once two rows of beans, pease, or wheat. This machine is easily wrought by two horses. A is the hopper for containing the seed; B, circular boxes for receiving the seed from the hopper; CC two square boxes which receive the seed from small holes in the circular boxes as they turn round; and last of all, the seed is dropped into the drills through holes in the square boxes behind the coulter D. The cylinder E follows, which, together with the wheel F, regulates the depth of the coulter, and covers the seed; the harrow G comes behind all, and covers the seed more completely. HH, two sliders, which, when drawn out, prevent the seed from falling into the boxes; and, I, is a ketch which holds the rungs, and prevents the boxes from turning, and losing seed at the ends of the ridges.

Pl. 15. fig. 7. represents a *single Hoe-plough* of a very simple construction, by which the earth in the intervals is stirred and laid up on both sides to the roots of the plants, and at the same time the weeds are destroyed. AA the mould-boards, which may be raised or depressed at pleasure, according as the farmer wants to throw the earth higher or lower upon the roots of the plants.

A *Drill-Rake* for pease is given at Pl. 15. fig. 8. This instrument, which is chiefly calculated for small inclosures of light grounds, is a sort of strong plough rake, with four large teeth at *a, a, b, b*, a little incurvated. The distance from *a* to *a*, and from *b* to *b*, is nine inches. The interval between the two inner teeth, *a* and *b*, is three feet six inches, which allows sufficient room for the hoe-plough to move in. To the piece of timber *cc*, forming the head of the rake, are fixed the handles *d*, and the beam *e* to which the horse is fastened. When this instrument is drawn over a piece of land made perfectly fine, and the man who holds it bears upon the handles, four furrows, *f, g, b, i*, will be formed at the distances determined by the construction of the instrument. These distances may be accurately preserved, provided that the teeth *a a* return when the ploughman comes back, after having ploughed one turn, in two of the channels formed before, marked *b b*: thus all the furrows in the field will be traced with the same regularity. When the ground is thus formed into drills, the pease may be

scattered by a single motion of the hand at a certain distance from one another into the channels, and then covered with the flat part of a hand-rake, and pressed down gently. This is an extremely simple instrument, and may be made or repaired by any workman.

At Fig. 9. pl. 15 is represented *Cooke's Drill Machine*. A, the upper part of the seed-box, B, the lower part of the same box. C, a moveable partition, with a lever, by which the grain or seed is let fall at pleasure from the upper to the lower part of the seed-box, from whence it is taken up by cups or ladles applied to the cylinder D, and dropped into the funnel E, and conveyed thereby into the furrow or drill made in the land by the coulter F, and covered by the rake or harrow G. H, a lever, by which the wheel I is lifted out of gear with the wheel K, to prevent the grain or seed being scattered upon the ground, while the machine is turning round at the end of the land, by which the harrow G is also lifted from the ground at the same time, and by the same motion, by means of the crank, and the horizontal lever *b b*. L, a sliding lever, with a weight upon it, by means of which, the depth of the furrows or drills, and consequently the depth that the grain or seed will be deposited in the land, may be readily ascertained. M, a screw in the coulter beam, by turning of which, the seed-box B is elevated or depressed, in order to prevent the grain or seed being crushed or bruised by the revolution of the cups or ladles. Fig. 11. a rake with iron teeth, to be applied to the under side of the rails of the machine, with staples and screw nuts at *n n*, by which many useful purposes are answered, viz. in accumulating cutch or hay into rows, and as a scarificator for young crops of wheat in the spring, or to be used upon a fallow; in which case, the seed-box, the ladle cylinder, the coulters, the funnels, and harrows, are all removed.

In this side view the machine is delineated, for the sake of perspicuity, only with one seed-box, one coulter, one funnel, one harrow, &c. but the complete machine is furnished with five coulters, five harrows, seven funnels, a seed-box in eight partitions, &c. with ladles of different sizes, for different sorts of grain, seeds, &c.

These machines equally excel in setting or planting all sorts of grain and seeds, even carrot seed, to exactness, after the rate of from eight to ten chain acres per day, with one man, a boy, and two horses. They deposit the grain or seed without grinding or bruising it in any quantity, from one peck to three bushels per acre, regularly and uniformly, and at any given depth, from half an inch to half a dozen inches, in rows at the distance of twelve, sixteen, and twenty-four inches, or any other at pleasure. They are equally useful on all lands, durable, and easy to manage.

The ladle cylinder D is furnished with cups or ladles of four different sizes for different sorts of grain or seeds, which may be distinguished by the numbers 1, 2, 3, 4. N^o 1. (the smallest size) is calculated for turnip-feed, clover-feed, cole-feed, rape, &c. and will sow something more than one pound per statute acre. N^o 2. for wheat, rye, hemp, flax, &c. and will sow something more than one bushel per acre. N^o 3. for barley; and will sow one bushel and a half per acre. N^o 4. for beans, oats, pease, vetches, &c. and will sow two bushels per acre. But notwithstanding the above specified quantities of grain or seeds, a greater or less quantity of each may be sown at pleasure, by stopping up with a little clay, or by adding a few ladles to each respective box. The grain or seeds intended to be sown, must be put in those boxes, to which the cups or ladles as above described respectively belong, an equal quantity into each box, and all the other boxes empty. The ladle cylinder may be reversed, or turned end for end at pleasure, for different sorts of grain, as occasion may require. And for sowing beans, oats, pease, &c. with a five-coulter machine, four large ladles must occasionally be applied at equal distances round those

parts of the cylinder which sustain the two end boxes. For sowing barley, eight large ones must be applied as above; or four ladles, N^o 2. to each of the wheat boxes. These additional ladles are fixed on the cylinder with nails, or taken off in a few minutes; but for sowing with a four coulter machine, these alterations are unnecessary. The funnels are applied to their respective places by corresponding numbers. Care should be taken, that the points of the funnel stand directly behind the backs of the coulters, which is done by wedges being applied to one side or other of the coulters, at the time they are fixed in their respective positions.

The machine being properly prepared, the seed put in, and the land reduced to a proper state by plowing, harrowing, and rolling, the driver should walk down the furrow or edge of the land, and having hold of the last horse's head with his hand, keep him in such a direction as will bring the outside coulter of the machine within three or four inches of the edges of the land or ridge, at which uniform extent his arm must be kept till he comes to the end of the land; where having turned round, he must come to the other side of his horses, and walk upon the last outside drill, having hold of the horse's head with his hand as before, keep the machine in such a direction as will strike the succeeding drill at such a distance from the last outside one, or that he walks upon, as the coulters are distant from each other.

The person attending the machine should put down the lever H soon enough at the end of the land, that the cups or ladles may have time to fill before he begins to sow; and at the end of the land, he must apply his right hand to the middle of the rail between the handles, by which he will keep the coulters in the ground, while he is lifting up the lever H with his left hand, to prevent the grain being scattered on the headland while the machine is turning round; this he will do with great ease, by continuing his right hand upon the rail between the handles, and applying his left arm under the left handle, in order to lift the coulters out of the ground while the machine is turning round.

The chief difficulty in using the machine consists in driving it straight. When seed is wanting in the lower boxes B, they must be supplied from the upper boxes A, by applying the hand, as the machine goes along, to the lever C. The lower boxes B should not be suffered to become empty before they are supplied with seed, but should be kept nearly full, or within an inch or so of the edge of the box. If chalk lines are made across the backs of the coulters, at such a distance from the ends as the seed should be deposited in the ground (viz. about two inches for wheat, and from two to three for spring corn), the person that attends the machine will be better able to ascertain the depth the seed should be deposited in the drills, by observing, as the machine goes along, whether the chalk lines are above or below the surface of the land; if above, a proper weight must be applied to the lever L, which will force the coulters into the ground; if below, the lever L and weight must be reversed, which will prevent their sinking too much.

As the lands or ridges are of different sizes, in different parts of the country, where the machine is too wide for the land, one or more funnels may occasionally be stopped with a little loose paper, and the seed received into such funnel returned at the end of the land, or sooner if required, into the upper seed-box. But for regularity and expedition, lands consisting of so many feet wide from outside to outside, as the machine contains coulters, when fixed at twelve inches distance, or twice or three times the number, &c. are best calculated for the machine. In wet soils or strong clays, lands or ridges of the width of the machine, and in dry soils, of twice the width, are recommended. For sowing of narrow high ridged lands, the outside coulters should be let down, and the middle ones raised, so that the

points of the coulters may form the same curve that the land or ridge forms. And the loose soil harrowed down into the furrows should be returned to the edges of the lands or ridges from whence it came, by a double mould-board or other plough, whether the land be in a wet or in a dry state. Clover and other lays, intended to be sown by the machine, should be ploughed a deep strong furrow and well harrowed, in order to level the surface, and to get as much loose soil as possible for the coulters to work in; and when sown, if any of the seed appears in the drills uncovered by reason of the stiff texture of the soil, or toughness of the roots, a light harrow may be taken over the land, once in a place, which will effectually cover the seed, without displacing it at all in the drills. For sowing lays, a considerable weight must be applied to the lever L, to force the coulters into the ground; and a set of wrought-iron coulters, well-steelled, and made sharp at the front edge and bottom, are recommended; they will pervade the soil more readily, consequently require less draught, and expedite business.

When carrots are to be sown, one bushel of saw-dust is to be added to each pound of carrot seed, which is sufficient for half an acre. The saw-dust should be made dry, and sifted to take out all the lumps and chips, and divided into eight equal parts or heaps; the carrot-feed should likewise be dried, and well rubbed between the hands, to take off the beards, so that it will separate readily, and being divided into eight equal parts or heaps, one part of the carrot-feed must be well mixed with one part of the saw-dust, and so on, till all the parts of carrot-feed and saw dust are mixed and incorporated together; in which state it may be sown very regularly in drills at twelve inches distance, by the cups or ladles No 2. A ladle full of this dust will, upon an average, contain three or four carrot feeds, by which means the carrot-feed cannot be otherwise than regular in the drills. In attempting to deposit small seeds near the surface, it may sometimes happen that some of the seeds will not be covered with soil; in this case, a light roller may be drawn over the land after the seed is sown, which, besides covering the seeds, will level the surface, and prepare the land for an earlier hoeing. With this machine the lightest kinds of grain or seed may be sown, even in the highest winds, by only using the precaution of placing a screen of any kind of cloth, or a sack, supported by two uprights nailed to their sides behind the funnels, which will prevent the grain or seed being blown out of its direction in falling from the ladles into the funnels. The same may be accomplished by small pipes of tin fitted on to the ends of the funnels, to convey the grain or seed near the surface of the land.

Pl. 15. fig. 10. exhibits a *Hand Hoe*, of a simple construction, by which one man will effectually hoe two chain acres per day, earthing up the soil at the same time to the rows of corn or pulse. This hoe is worked much in the same manner as a common Dutch hoe, or scuffle, is worked in gardens. The handle is elevated or depressed, to suit the size of the person who works it, by an iron wedge applied to the upper or under side of the handle inserted into the socket of the hoe. The wings or moulding plates of the hoe, which are intended to earth up the soil to the rows of corn, should never be used for the first hoeing, but always for the last.

Cooke's improved Drill Machine and Horse-Hoe. The advantages of this improved drill over the former chiefly consist, 1st, In the wheels BB, Pl. 16. fig. 5. being so large that the machine can travel on any road without trouble or danger of breaking; also from the farm to the field, &c. without taking to pieces; requiring only half the draught which the old machine requires. 2d, In the coulters CC, with all the coulters, moving with great ease, on the principle of the pentagraph, to the right or left, so as to counteract the irregularity of the horse's draught, by which means the drills may be made

straight: and where lands or ridges are made $4\frac{1}{2}$ or $9\frac{1}{2}$ feet wide, the horse may always go in the furrow, without setting a foot on the land, either in drilling or horse-hoeing. 3d, In the seed supplying itself regularly, without any attention, from the upper to the lower boxes as it is distributed. 4th, In lifting the pin M on the coulters-beam to a hook L on the axis of the wheels; by which means the coulters are kept out of the ground at the end of the land, without the least labour or fatigue to the person who attends the machine. 5th, In going up or down steep hills, the seed-box is elevated or depressed accordingly, so as to render the distribution of the seed regular; and the seed, being covered by a lid, is screened from wind or rain.

These are the principal advantages appertaining to this machine, which, though considerable in the process of drilling, are as nothing compared with those which arise from the use of the horse-hoe, by which from eight to ten acres of land can be hoed in one day, with one man, a boy, and one horse, at the trifling expence of 6d. or 8d. per acre, in a style far superior to, and more effectual than any hand hoeing whatever, and also at seasons when it is impossible for the hand-hoe to be used at all.

At AA, Pl. 16. fig. 5. are seen the shafts of the machine, applied to the axis of the wheels, so that the horse may go on the land, or in the furrow without setting a foot upon the land, either for the purpose of drilling or horse-hoeing.

BB, the wheels.

CC, coulters-beam, with holes or mortises for the coulters at different distances.

DD, handles of the machine, applied to the coulters-beam, also to the axis of the wheels, by hooks and eyes, or staples.

EE, upper seed-box in partitions, covered by a lid, to protect the grain or seed from wind or rain.

FF, lower seed-box in partitions.

GG, slides between the upper and lower seed-boxes, for regulating the quantity of seed sown.

HH, cylinder with cups or ladles of different sizes, for different sorts of grain or seeds; by which the grain or seeds are taken up, and dropped into the funnels II, and conducted thereby into incisions or drills made in the land by the coulters KK.

L, a hook applied to the axis of the wheels.

I, a chain applied to the coulters-beam, the last link of which, being put upon the lowest hook, will prevent the tubes of the funnels from being displaced, when the machine is crossing deep furrows or gutters.

M, a pin of iron projecting from the coulters-beam, which being lifted on the hook L, at the end of the land, will bear the coulters out of the ground, while the machine is turning round, or on any other occasion, without any labour to the person who attends the machine, in supporting them.

N, a cog-wheel.

O, a cog-wheel, turned by the wheel N.

P, a lever and string, passing over a pulley to the axis of the cylinder H, by moving the lever P to the notch in the staple Q, the wheel O will be lifted out of gear with the wheel N, by which means the distribution of grain or seed may be stopped at pleasure, in an instant, at the end of the land, or on any other occasion.

R, an iron bar with holes in it, by means of which, and a pin going through the holes, the seed-box may be elevated or depressed, so as to keep the lid of the box horizontally level, whether going up or down steep hills, or on level ground.

SS, two staples in the ends of the seed-box, for the reception of two slips of wood, with canvas to prevent the wind from interrupting the grain or seed; also to prevent dirt or soil falling from the wheels into the funnels II.

Horse Hoe. Pl. 16. fig. 6. represents the shafts, the axis

and wheels, the coulter-beam, with handles, &c. as in fig. 5. being part of the said machine, and is convertible into a horse-hoe with six shares, by taking away the seed-box EE, the cylinder HH, the funnels II, and the coulters KK, as in fig. 5. and introducing the hoes AAAAAA, fig. 6. in the places of the coulters.

B, a guide projecting from the hoe-beam, which is useful in influencing the direction of the hoes, so as to avoid cutting up the rows of corn.

Manner of using the machine. The process of drilling should never be attempted but when the soil is tolerably dry, and when it has undergone proper ploughing, harrowing, &c. The method of using this machine is in many respects the same as that which has been mentioned above.

Pl. 16. fig. 5. represents a back view of the machine, when put together for working. When the horse is put in the shafts, care should be taken that the chains or tugs by which he draws are of equal lengths; otherwise the machine will have a constant tendency to deviate from the horse's line of traction. But when the horse goes in the furrow, the near side may be somewhat shorter; and a chain may be extended from the end of the cross-bar to a part of the shaft near the horse's shoulder.

In going from the farm to the field, or returning from the field to the farm, the pin or guide M must be lifted on to the hook L, which will bear the coulters off the ground. And when going on rough roads, if the coulter-beam CC and the axis of the wheels are lashed together by a rope or chain, it will prevent the coulters receiving any injury by coming suddenly to the ground.

The grain or seed must be put in the upper boxes EE, an equal quantity in each box.

The cups or ladles upon the cylinders are of four different sizes, and are distinguished by the numbers 1. 2. 3. 4.

No. 1. the smallest size, is painted white for lucerne, clover, cole, rape, &c. and will sow two pounds per acre. Also for turnip, and will sow one pound per acre; every other cup being stopped up with a little soft clay.

No. 2. is painted red for wheat.

No. 3. is painted green for barley.

No. 4. is painted yellow for beans, oats, pease, tares, &c.

By raising or lowering the slides GG, fig. 5. a greater or less quantity of grain or seed may be sown at pleasure.

When the slides GG are as low as they can be, the wheat cups painted red, will sow something more than three pecks of wheat per acre; and more in proportion the higher they are raised, not exceeding one bushel and a half, when raised as high as they can be, in rows at nine inches apart.

The cups painted green, when the slides are as low as they can be, will sow one bushel of barley per acre; and more in proportion as the slides are raised, not exceeding two bushels, in rows at nine inches apart.

The cups painted yellow, when the slides are as low as they can be, will sow almost two bushels of beans, oats, pease, &c. per acre; and more in proportion as they are raised.

The funnels II, fig. 5. are all numbered 1. 2. 3. 4. 5. 6. and for drilling at nine inches, must be applied to their respective places, so as to correspond with the number 1. 2. 3. 4. 5. 6. of the seed box; six coulters being fixed in the coulter-beam, at the distance of nine inches from each other.

For drilling at twelve inches apart, five coulters must be fixed in the beam, at eleven inches and a quarter from each other, when the order of the funnels will stand 1. 4. 5. 2. 3. 6. and no seed put in the box opposite the funnel No 5. when placed as above; the waste funnel may be stopped with paper to receive any seed that may accidentally fall therein.

For drilling at eighteen inches apart, three coulters must be fixed in the left end of the beam at eighteen inches from each

other, when the order of the funnels will stand 1. 2. 3. 4. 5. 6. and seed put in the boxes opposite the funnels 1. 3. 5. only, the other boxes being empty.

For drilling at twenty-two inches, three coulters must be fixed in the beam, one at each end, and one in the middle, when the order of the funnels will stand 1. 4. 5. 2. 3. 6. Seed being put in the boxes, opposite the funnels 1. 5. 6. only, the other boxes being empty. Two rows of pease at nine or twelve inches apart, and a space of twenty-two inches alternately, has been tried and approved. In level lands, without ridge and furrow, if the attendant on the machine cannot find a straight side to begin at, he should mark out with sticks or bushes a straight line, along one side of the field, for his direction; and when drilling at nine inches, in order to make the space between the two adjoining rills, as he returns, equal to the rest, the wheel of the machine must be brought very near the last impression of the coulter, and three inches more distant from the last impression of the coulter when drilling at twelve inches. And of other distances accordingly.

As the machine approaches the land intended to be drilled, the lever P, fig. 5. should be lifted from the notch in the staple Q, when the coulters are two feet on this side the exact place where seed should be deposited; and the pin M removed from the hook L, by lifting up the handles DD.

When the machine arrives at the end of the land, the lever P must be moved to the notch Q, which will stop in an instant the distribution of the feed, and the pin M lifted on the hook L, which will support the coulters out of the ground while the machine is turning round.

If the coulter should not make the incisions or drills something more than two inches deep in light sands or loams, and one and a half in strong clays or wet soils, they may be forced into the ground by the hand; or by weights, or a beam of wood four feet long and three or four inches thick, being suspended by chains or cords at the hooks TT in the handles of the machine for that purpose. If, in attempting to make the drills straight, the horse should deviate from his proper direction, the coulter-beam with all the coulters will be readily moved, this way or that way at pleasure, so as to make the drills straight by counteracting the irregularity of the horse's line of traction. If the machine should happen to be too wide for any given ridge, one or more funnels may be stopped with a little loose paper, and the seed received into such funnel returned into the upper seed-box. In drilling narrow high-ridged lands, the outside coulters may be lowered, and the middle ones raised, so that the points of the coulters may form the same curve which the ridge forms. The top of the feed-box when shut, should be kept horizontally level, whether going up or down steep hills or on level ground. This will make the distribution of the seed uniformly the same. The higher the front edge of the box is raised upon the bar R, the seed will descend more copiously into the lower boxes, consequently a greater quantity will be distributed.

The lower funnels placed behind the coulters should be lashed fast to the coulters with leathern thongs, or cords: and if in lifting up the coulter-beam at the ends of lands, the upper funnels should, by chance, be displaced, a small nail may be driven into the edge of the feed-box, close above the edge of each funnel, which will prevent the funnels being displaced.

Method of using the Horse-hoe. For horse-hoeing a crop of any kind of corn, drilled at nine inches apart, the horse must be conducted along the third row or drill, beginning to number the rows from the left-hand side of the six rows drilled at one operation of the machine. And the person who attends the hoes must keep the pin B, fig. 6. directly over the third row of corn; and so long as he does this, it will be impossible for him to injure it in the least. But for horse-hoeing corn at twelve inches apart, the horse must be conducted along the second space, between the rows or drills, beginning to number the

spaces from the left-hand side of the five rows drilled at one operation of the machine.—And the person who attends the hoes must keep the pin B, fig. 6. directly over the middle of the second space, described as above: the same rule will hold good for hoeing at different distances. Where the space between the two adjoining outside drills shall happen to be irregular (i. e.) too narrow at some places for the hoe to pass, it may be advisable to take out the share, which would otherwise hoe that space, and leave it to be hoed by hand.

Soils of different textures will require to be hoed with shares of different sizes; nothing but experience can point out the size which is best adapted to any particular soil. In all light sandy soils or loams, or any other soils sufficiently pulverized, shares from five to six inches broad, for nine-inch drills, and eight inches broad for twelve-inch drills, will work safely and effectually. In strong clays intermixed with pebbles, the hoe-shares must not be so broad; and it may not be impossible to find some such soils as will bid defiance to all flat hoeing whatever. If, nevertheless, the texture of the soil in the spaces of the rows of corn is torn to pieces by long narrow plates of iron, resembling points or chisels, being introduced in the hoe-share shanks, A A A A A, fig. 6. instead of the hoe plates, the advantages resulting from such a process will be very considerable.

The hoe plates or shares may be set to enter the soil deeper or shallower, by lowering or raising the shanks A A A A A, in the respective mortises in the beam, or by lowering or raising the hooks applied to the shank C C, on the axis of the wheels, by which the hoes are drawn.

Lands cannot be too level on the surface, for practical, effectual, and expeditious horse-hoeing. But where lands, or ridges, are formed so round, that all the hoe-plates cannot be brought to work at equal depths in the soil at the same time, so many as cannot be brought into use may be laid aside.

This horse-hoe may be applied to many useful purposes, besides hoeing crops of drilled corn, particularly for cutting up the rows of stubble as soon as the crop is carried, with such weeds as might escape the hoe; and for stirring of fallows, &c. &c. after the rate of ten acres a day, with one man, a boy, and two horses, particularly in the busy time of harvest, when it would be impossible to spare so many men and horses as would be required to stir the land with common ploughs, so as to answer the intended purpose. And by means of the same expeditious method of cutting up stubbles, immediately after the crop is carried, or rather before it is carried, as soon as it is cut and set up, in order to gain time for the sowing of grass seeds a second time, where they may have missed, or cole, or rape, or turnip, for food of sheep or cattle, in winter or spring, extraordinary advantages may be derived.

M'Dougal's improved Hoe. This hoe, as seen in plate 16. fig. 4. is extremely simple in its construction, and answers all the purposes of a hand-hoe in a very superior manner, particularly the clearing from weeds and loosening the soil in the intermediate spaces of pulse or grain which has been sown in equidistant rows, and at the same time for earthing up the plants. It consists of two principal parts; the first a beam of wood, having at its fore end a semicircle forming two handles, between which one man walks, and draws the instrument forwards: this beam at the other end is divided, and moves on two small gudgeons, by which it is accommodated to the height of the hands of the person drawing, and room allowed for a wheel to move in.

The other beam is held at its further end by another man, who guides the instrument and regulates its depth in the ground, at the same time that he assists its action by thrusting it forwards. This beam is also divided at its fore end, so as to admit a wheel to run between the sides, which wheel serves to adjust the depth and ease the draught in working. The hoes are made of cast iron, and fixed in a mortise, in the hinder beam, by a

proper wedge, and may be made of different forms or dimensions, as the work to be performed may require.

Middleton's Hay-collecting machine. This machine, which is seen in Pl. 16. fig. 1. is invented for the purpose of preventing the labour of dragging hay together by hand. It is drawn by four horses, in pairs, with a boy to manage and drive each pair.

But it will first be necessary that the hay should be put into rows, as is universally done before the loading of carts, waggons, or sledges; then, in order to sweep the hay together with greater facility, a man with a fork must go and turn the end of a row up, two or three yards, so as to form a sort of heap, and then walk on ten, twenty, or forty paces, and break the row, by turning the hay forward into another similar heap; and let him go on and repeat this operation to the end of the row, which he should do as fast as he can walk; then the boy who has the management of that pair of horses, to whom the empty machine is attached, must draw it across the end of the row; and, the moment the centre of the machine is at the middle of the row, let him turn his horses short round, to within a yard or two of the hay, so as to be in a proper position to set off: the other boy must instantly place his horses on the opposite side of the row, and hook the chain of his splinter-bar to the machine, pulling the gate or side of the machine round, so as it were to clasp the hay as at *a* fig. 1. The boys being mounted, and all now ready to start, let them draw slowly on for the first twenty or forty yards; they may then, if the business requires dispatch, increase their pace, urging the horses into their fastest walk, and from that into a slow trot, until as much hay is collected as the horses can draw: then, unhooking one end, let the horses at the other turn from the hay, and draw out the machine from behind it: then trot away to the end of the next row, and repeat the process, taking care to keep the horses on each side of the hay at equal distances from the row, and opposite to each other. When the machine is loaded, and the intention is to draw the load to a distant place, the four horses cannot be kept too near together.

The elevation of the machine, as it appears when drawn by one end, and empty, is shewn separate in the plate, where the scantlings of the several parts of the machine are marked.

The plan of the machine, when in the action of drawing the hay, is shewn in the plate at fig. 2, and lettered as follows: *a. a. a. a.* The places occupied by the horses, when drawing (though in many cases one horse on each side would be sufficient). *b.* The back, or principal part of the machine. *c. c.* The sides, or gates of the machine, which swing on the iron rods fixed in the back at *d. d.* *e.* The row of hay.

SECT. III. Of Ridges.

THE forming of land into ridges is advantageous in many respects. It is useful for removing wetness. Every furrow becomes a kind of drain: the rain that falls upon the ridge makes its way to the furrows, and by means of them is conveyed away from the field. It is also proper for enlarging the surface, as thereby not only a greater quantity of soil is exposed to the influence of the air, but also a great quantity of it actually employed in vegetation. There is no more soil indeed added to the field by enlarging the surface; but some of the soil that lies buried, while a field is in its natural state, is exposed to the air and brought within reach of the roots of plants, when it is laid up in ridges. Some of the plants which we cultivate in our fields, have what are called horizontal roots, that is, roots that creep along the surface, and go down but a short way. Now, it is obviously an advantage to these plants, to have a quantity of the soil below, to which their roots cannot extend, brought within their reach, which is done by enlarging the surface.

Fig. 6. First Harrow.

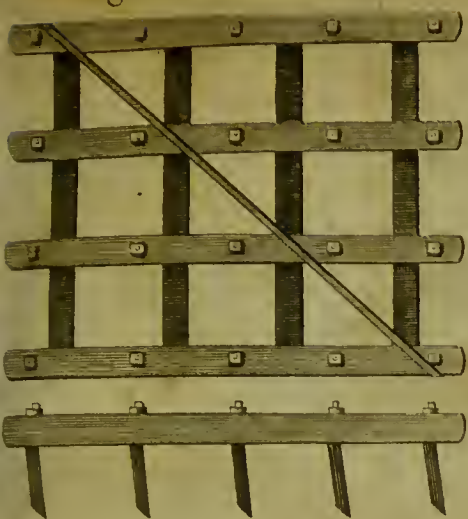


Fig. 7. Second Harrow.



Fig. 8. Third Harrow.

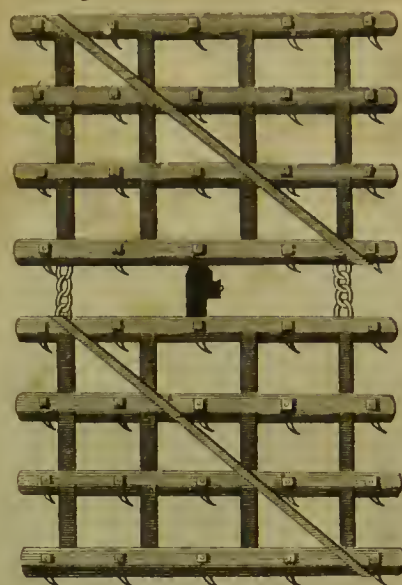


Fig. 1. Common Plough.

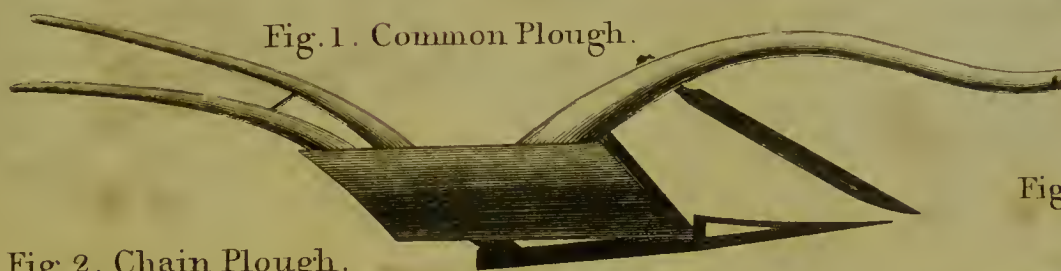


Fig. 2. Chain Plough.

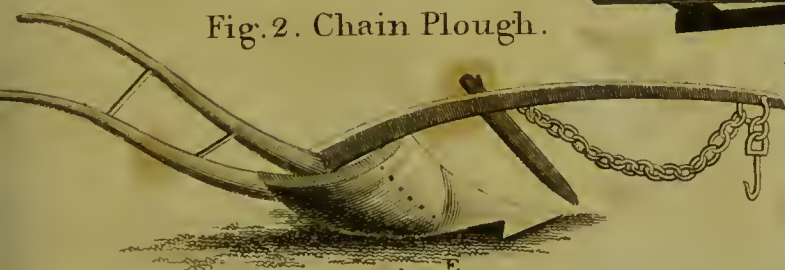


Fig. 9. Chain & Screw Harrow.

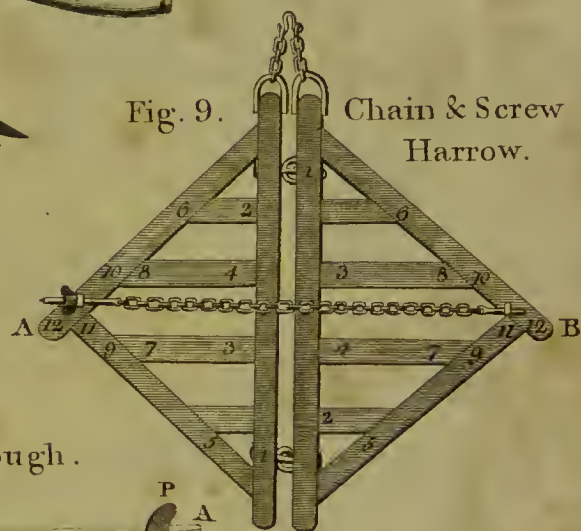


Fig. 3. Rotherham Plough.

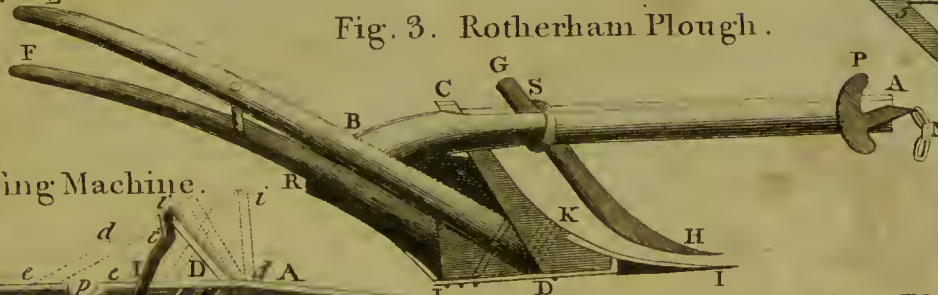


Fig. 10. Fallow Cleansing Machine.

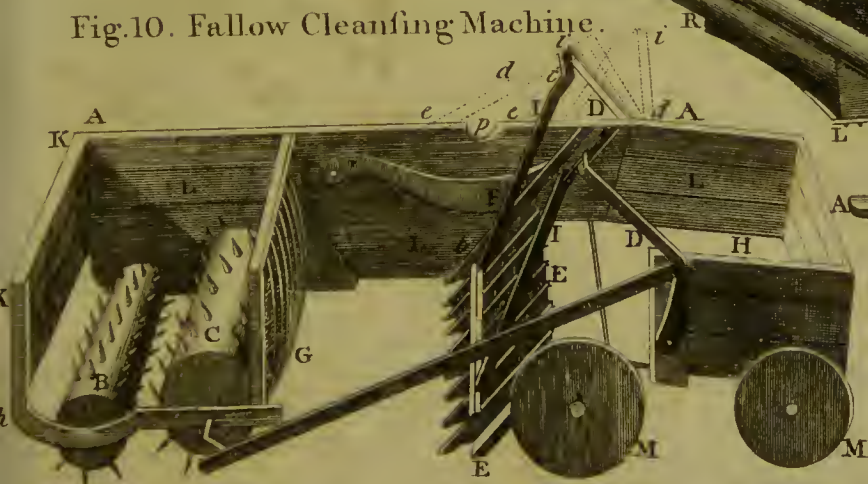


Fig. 4. Paring Plough.

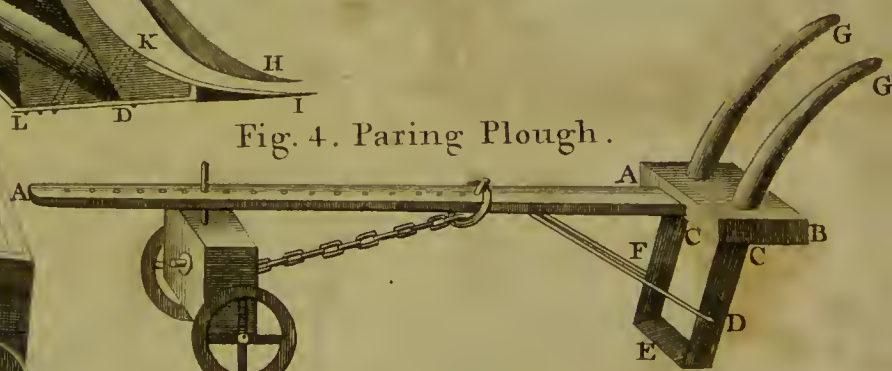


Fig. 5. Patent Sward Cutter.

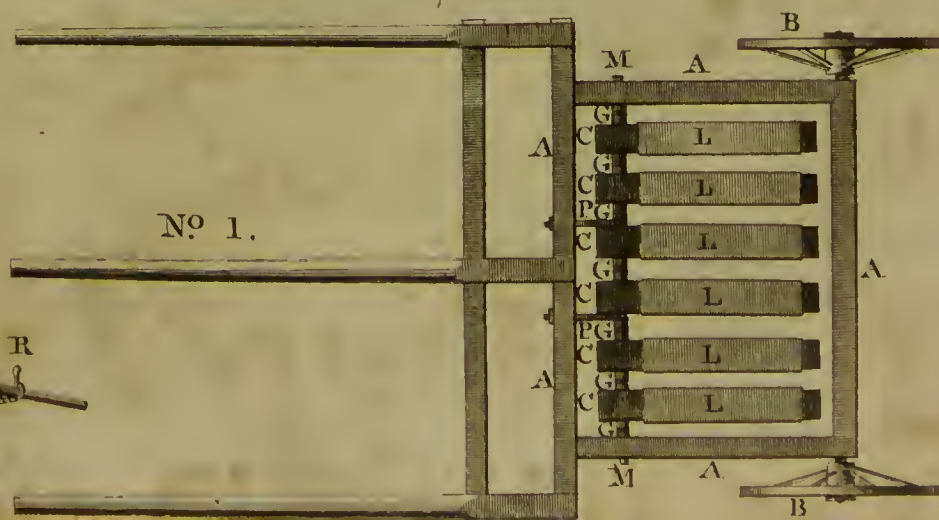
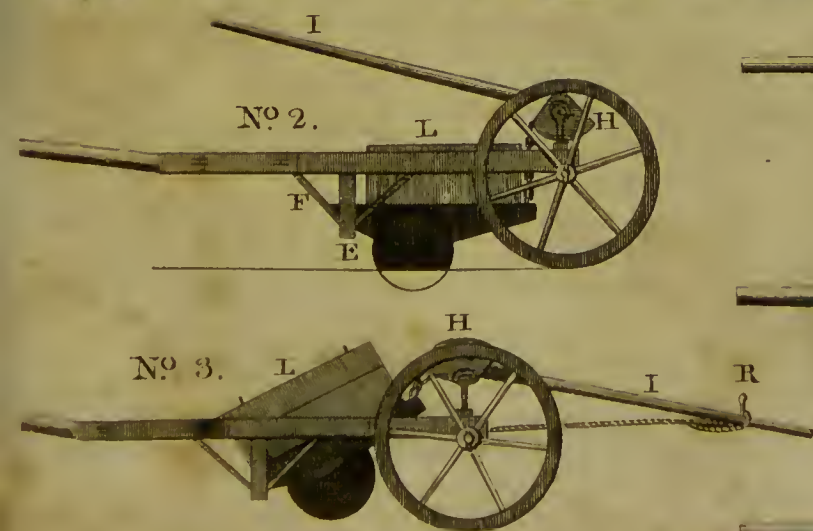


Fig. 1. Universal sowing Machine.



Fig. 2.

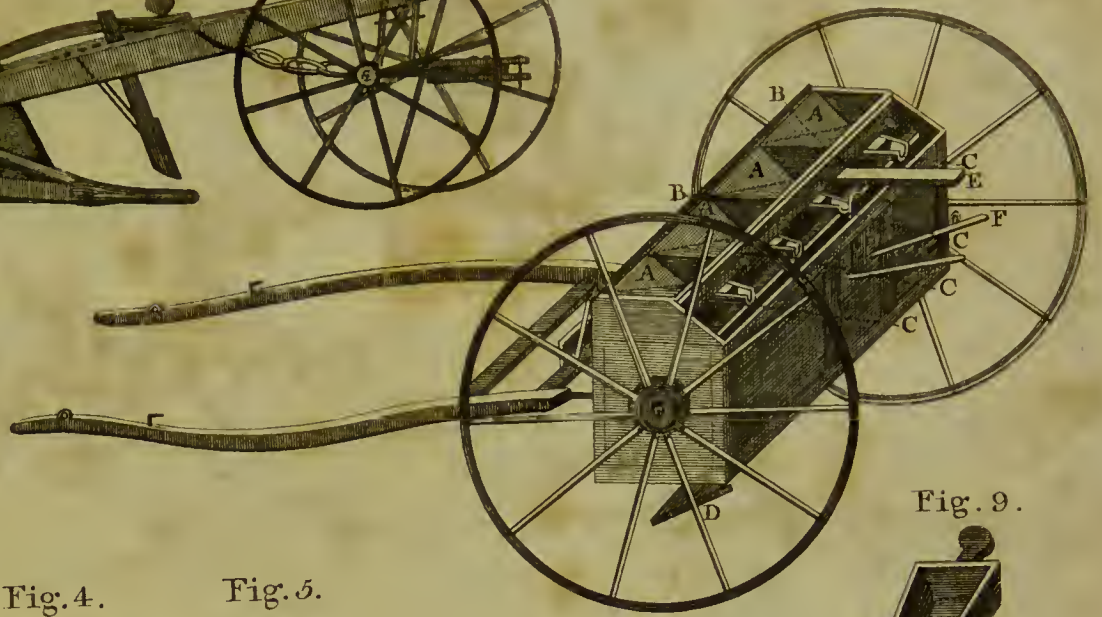


Fig. 7.

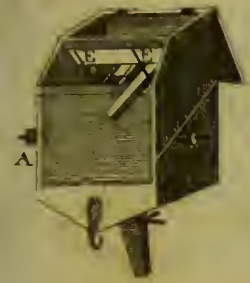


Fig. 3.

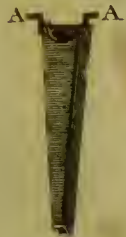


Fig. 4.



Fig. 5.



Fig. 6.



Fig. 9.



Fig. 8.

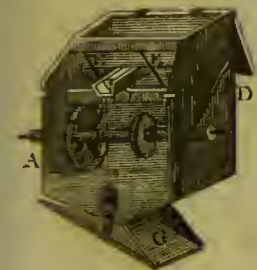


Fig. 11.



Fig. 13. Four Coultered Plough.

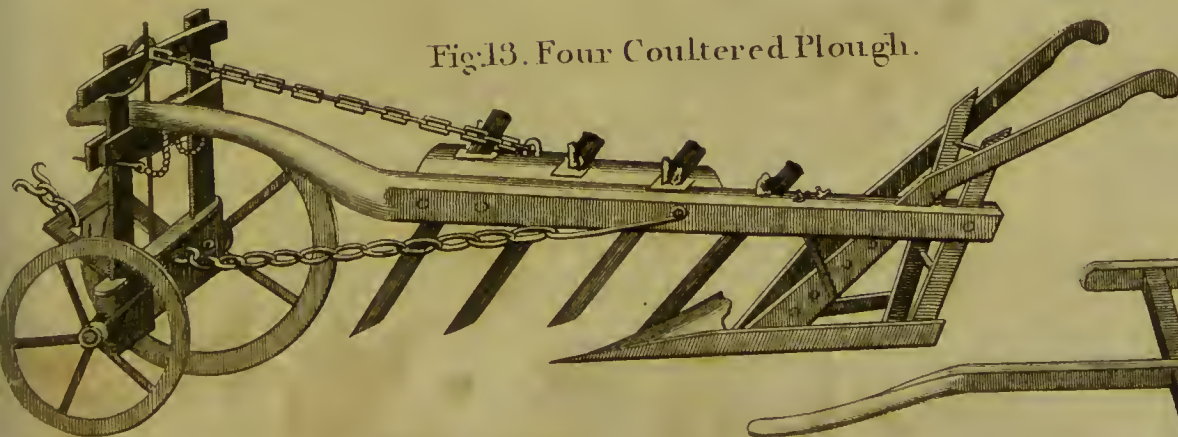


Fig. 12. Spike Roller.

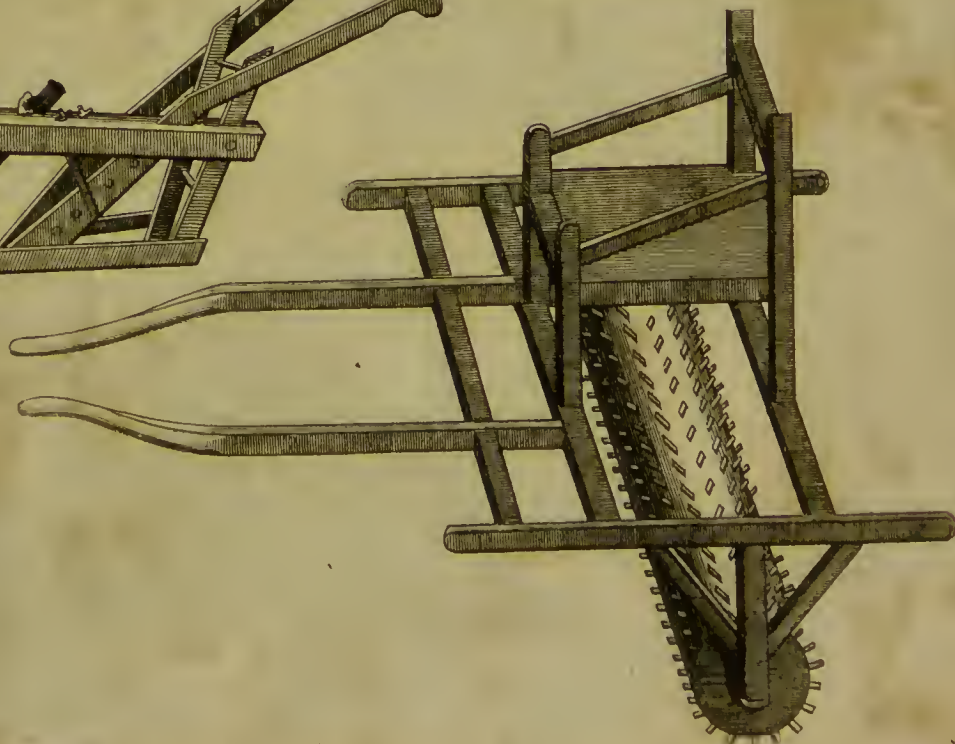


Fig. 10.

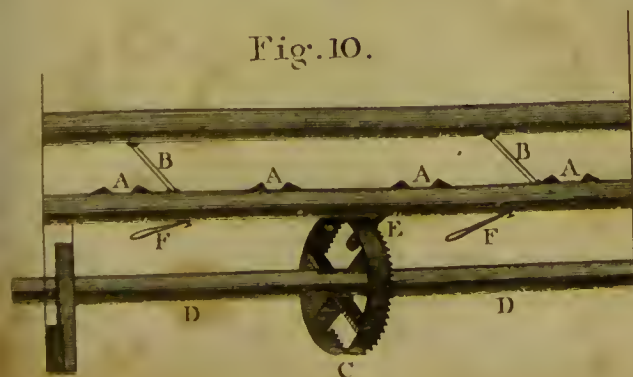


Fig. 1. Marking Plough.

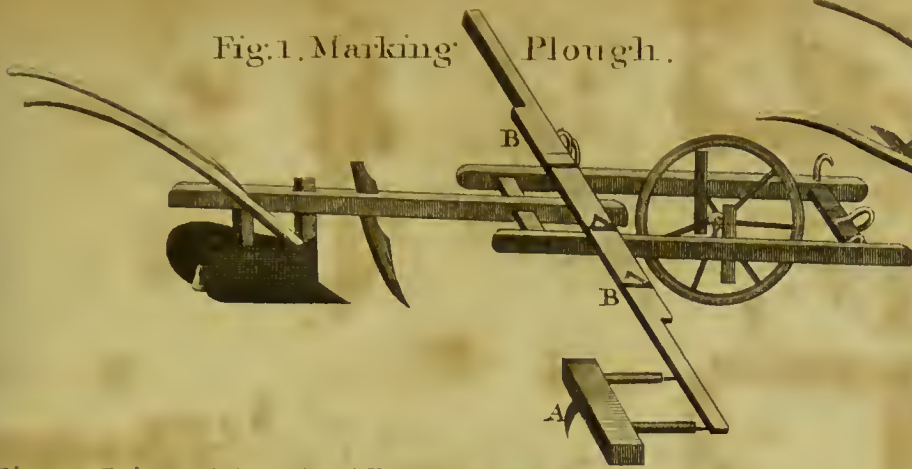


Fig. 2. Ley Plough.

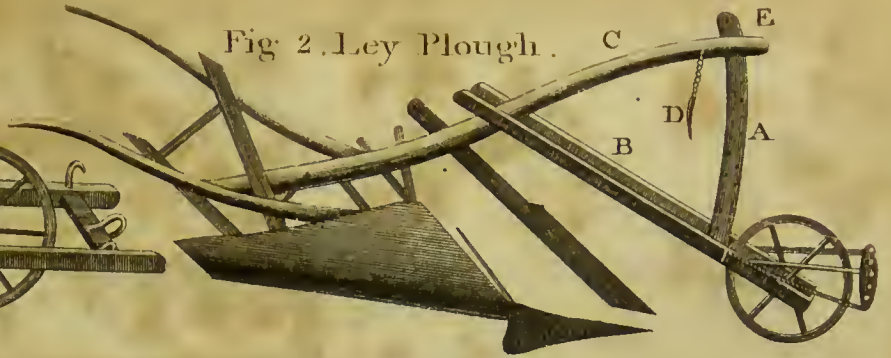


Fig. 4. Angular Weeding Harrow.

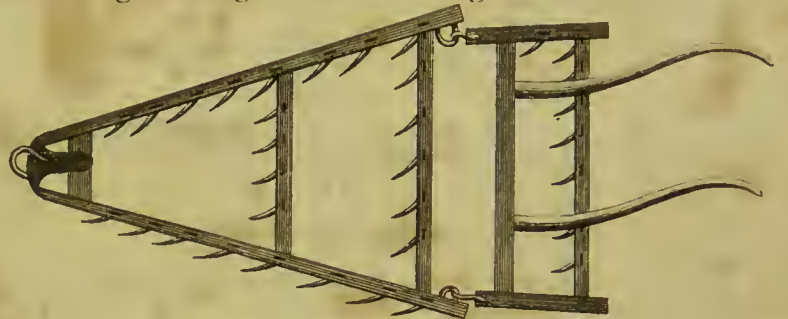


Fig. 5. Harrow with Shafts.

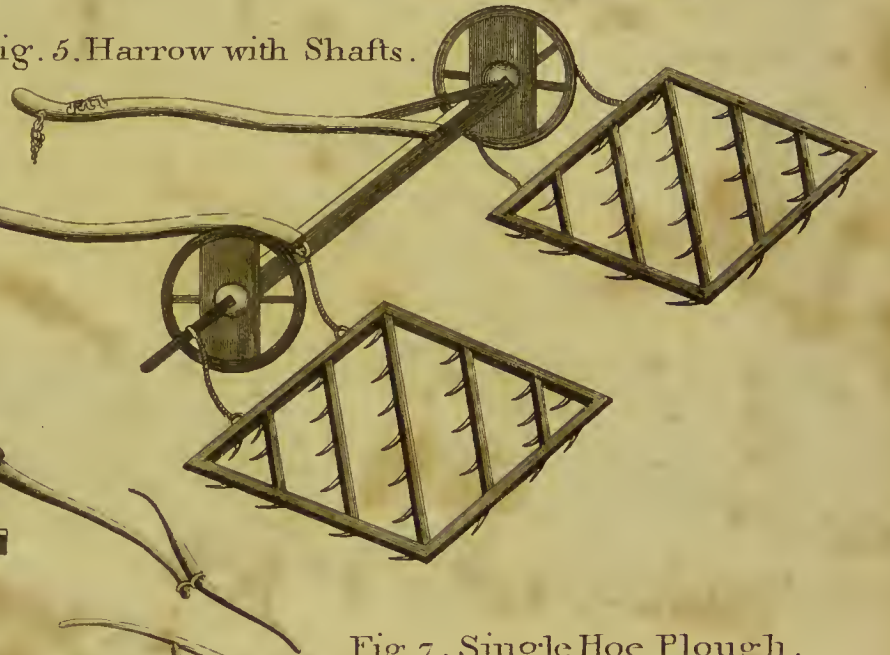


Fig. 6. Drill Plough.

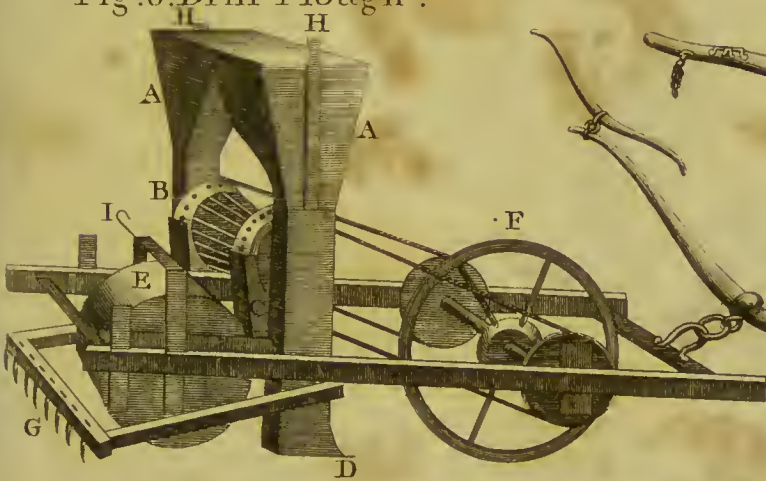


Fig. 7. Single Hoe Plough.

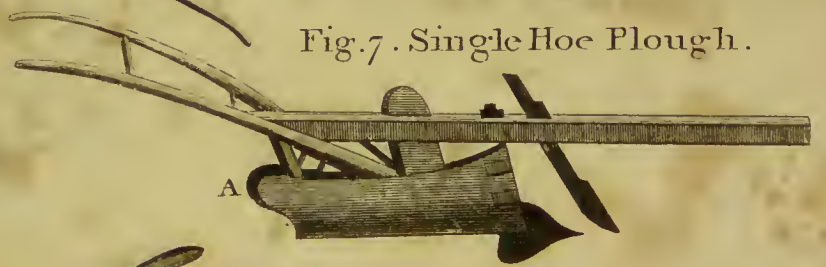


Fig. 8. Drill Rake.

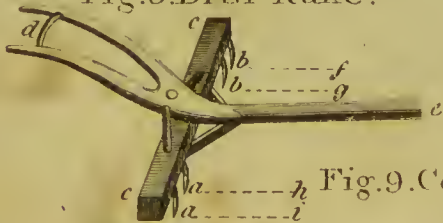


Fig. 9. Cook's Drill Machine

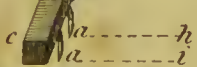
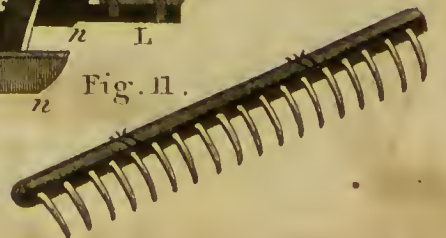


Fig. 10. Hand Hoe.



Fig. 11.



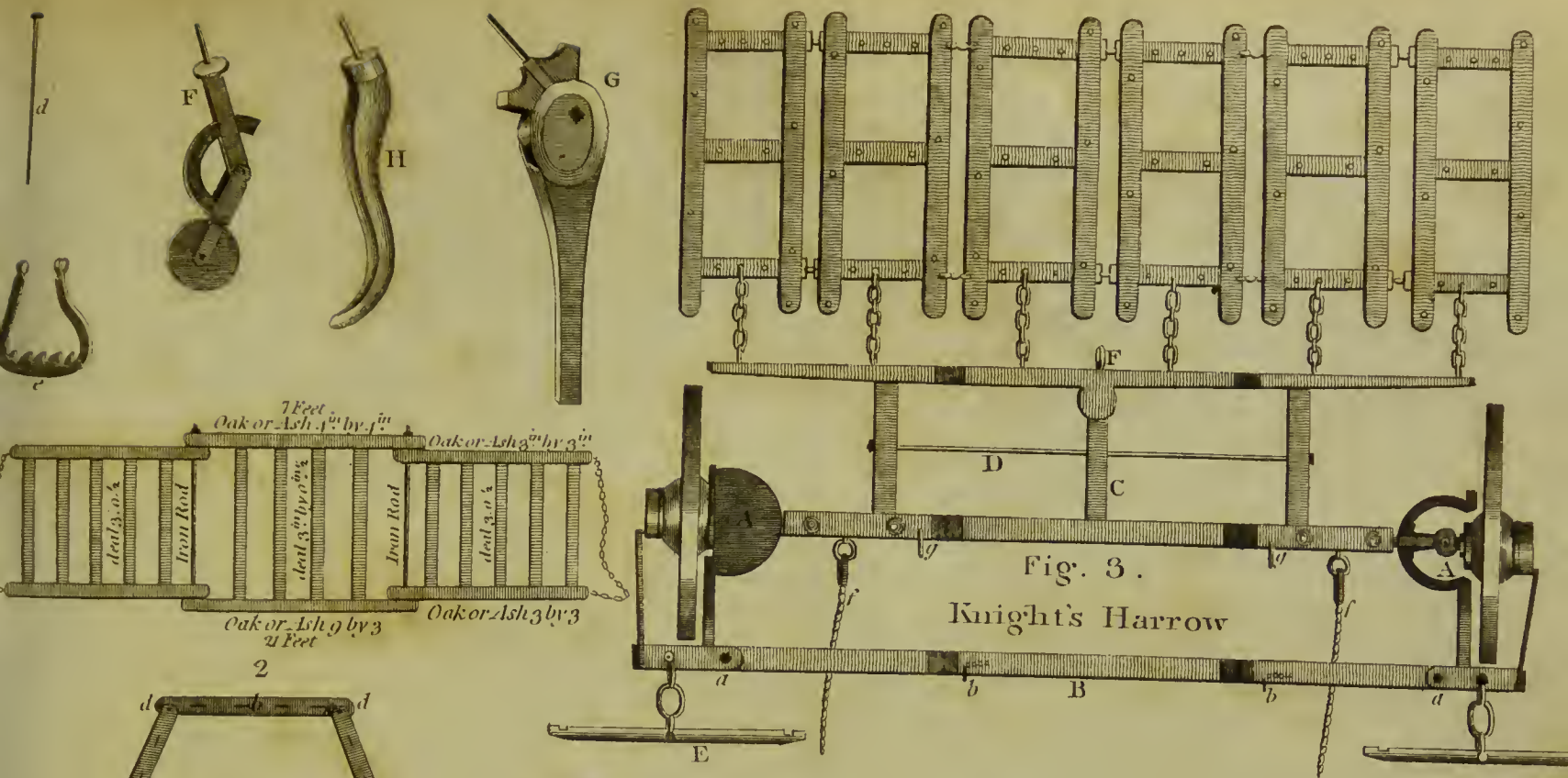


Fig. 4.
M^r. Dougale's Hoe.

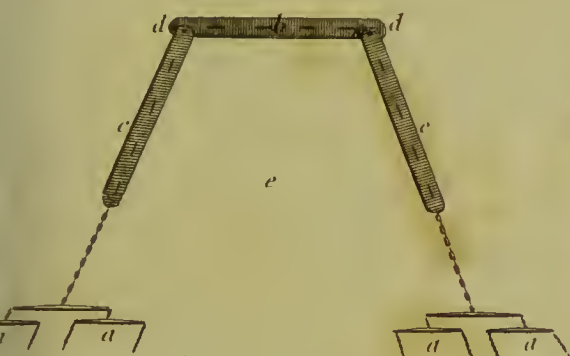


Fig. 1.

Middleton's Hay collecting Machine.



Cooke's Improved Drill Machine and Horse Hoe.
Fig. 5.

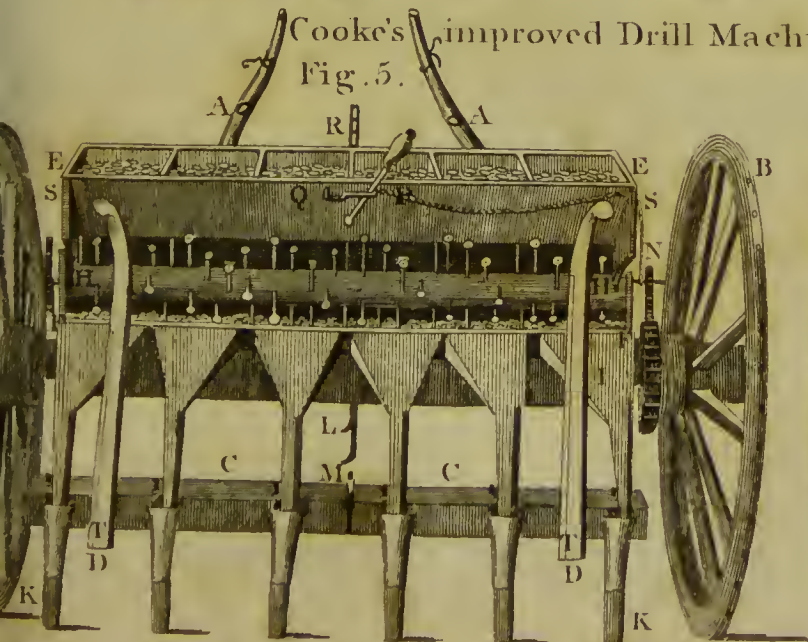
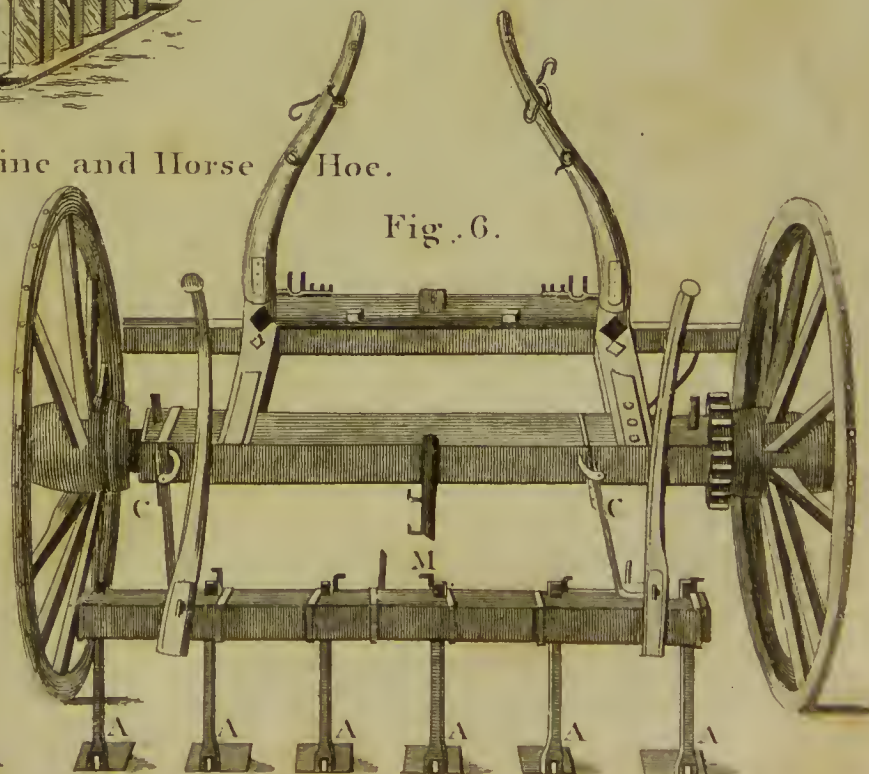


Fig. 6.



Even the tap-rooted plants, that is, such as push one principal root perpendicularly downwards, have horizontal roots, by which they are nourished; it must therefore be an advantage to them to have the surface extended. Having thus shown, that ridges are advantageous, as they remove wetness, and enlarge the surface, it is necessary now to consider what kind of ridges are most proper for answering the different ends. For removing wetness, the ridges ought to be narrow; as, the greater the number of ridges, the greater are the number of drains. When the soil is wet, the ridges ought also to be steep. For the steeper the ridges are, the water more easily finds its way to the furrows or hollows. And when the soil is very dry, it is submitted, if narrow ridges are not proper likewise. For by altering the ridges, and turning the furrows into the crowns, and the crowns into the furrows, a quantity of fresh soil is always employed in vegetation. When the crown of a ridge is turned into a furrow, it is obvious that some fresh soil must be turned up, which was not employed in vegetation in its former situation; and consequently the greater number there are of ridges, the greater the quantity of fresh soil employed. In cases in which the soil is just so wet as to occasion loss in the furrows, then the ridges should be somewhat broader. For, in such cases, the fewer the furrows are, the less is the loss.

It must also be observed, that a difference should be made betwixt the situation of land in the winter, and its situation in the summer. It may be convenient sometimes, when winter grain is to be sown, or when the land is to get winter fallowing, to make the ridges very narrow; and when summer grain is to be sown, to make them broader. And as it is an advantage to have the surface enlarged, the ridges ought to be made high in the middle or crown; for the higher that the ridge is made, the more is the surface enlarged and increased. But where the soil is shallow, the ridges, if broad, cannot be raised without depriving the furrows of soil: and therefore, to enlarge the surface on such land, the ridges must be made narrow; for this both enlarges the surface, and prevents the furrows from going below the soil. Where the soil is deep, the ridges may be made broader: for though they be raised in the crown, still there will be soil left in the furrows. The ridges must not however be made too broad: for it is evident that narrow ridges give more surface than broad ridges of the same degree of steepness, and do not cover the lower parts of the ridges so much from the influence of the sun and winds. But though, in general, it be recommended to raise the ridges in the crown, to enlarge the surface, and to allow the water more easily to find its way to the furrows; yet, in some low flat-lying land, it is proper to make the ridges as flat as possible, in order to raise the furrows. For the higher that the furrows are raised, there is, in some cases, the greater command of the water, and it is the more easy to find a fall for conveying it from the land. And flat ridges have this advantage over steep ridges; they can be sown, especially in the broad-cast method, with greater exactness. It is obvious from the method of sowing, that, in sowing steep ridges, it is not possible to prevent a great proportion of the seed from falling into the furrows. This proportion is also greatly increased by harrowing. Whereas, in sowing flat ridges, the seed is equally scattered, and the harrows do not remove it from its situation. It is therefore evident from these observations, that soils in different situations require to be laid out in different kinds of ridges. It is absurd to assert, that, in every case, one kind of ridges is preferable to another; that narrow ridges are better than broad ridges, and flat ridges better than steep ridges. In some situations, one kind of ridges is most proper; and, in other situations, another kind is most proper. Every farmer ought, therefore, to consider the nature of the soil he has to deal with, the advantages and disadvantages of each kind of ridges, and then determine which are most proper to be adopted.

If there be nothing in the nature of the soil to determine what kind of ridges are most proper, then narrow ridges are to be preferred; for this reason, that a quantity of land in narrow ridges is sooner ploughed than when in broad. It is obvious, that the two first furrows which the plough takes off from the ridge, are wider than any taken off afterwards, especially if the plough begins in the furrow, as is frequently the case; so that the greater number there are of ridges, the field is the sooner ploughed. Besides, when ridges are broad, it is obvious that the plough has more work, and must take longer time in turning, than when they are narrow. But then it is supposed that the ridges are straight and equal. If they are not, the greater number there are of them, the greater is the trouble, and the more time is spent in ploughing. This, however, is of no very great importance, since it seldom happens that the kind of soil does not determine the kind of ridges to be made.

In the making of ridges some other particulars must be attended to. All ridges ought to be made straight, crooked ridges being attended with several inconveniences. In ploughing them, the cattle are not always going exactly in the same direction with the plough; short turnings are often necessary, as fields are generally bounded by straight lines, or lines not crooked in the same manner with the ridges; and when there is a small descent, the water in the furrows does not so easily run off. There are also many other inconveniences attending crooked ridges, both in ploughing and other operations. But straight ridges not only remove the inconveniences with which crooked ridges are attended, but are attended with no inconveniences themselves: they require indeed a little attention in the ploughman, which is itself an advantage; and therefore upon all occasions are to be preferred. In all kinds of soil, ridges ought not only to be straight, but likewise equal to one another, and the same in all parts. Unequal ridges are attended with inconveniences, as well as crooked ridges. It is difficult to sow them with exactness; it is difficult to alter them when necessary; and the plough must often turn in the middle of the ridge, which does great harm, or be driven to the end without being of any use.

In different parts of this country the ridges are still crooked and unequal; and, in many places, they are much broader, and much higher raised in the crown, than the nature of the soil allows. Were the ridges altered, and the fields laid down in a proper manner, as the soil requires, it would be highly useful. At the same time, it must be observed, that much harm is done, by proceeding in this matter with too much precipitation. If the soil be very dry, ridges may however be altered without great danger, though high; and they may be made straight without being levelled. For, though the old furrows are still lower than the rest of the field, yet this is attended with no bad consequences in dry land; and by degrees, they are filled up in ploughing. But if the soil be wet, the ridges cannot be made straight till the ground is level, without great danger. For the water will lodge in the hollows of the old furrows, whence it will not be possible to force it. Some farmers indeed make their ridges straight before they are sufficiently levelled, draw water-furrows along the hollows of the old furrows, to carry off the water that is apt to lodge there. This is of some use, but does not fully answer the purpose. A quantity of loose earth, in ploughing, is thrown into the old furrows. The water, as it falls, penetrates this loose earth, and is retained by it, notwithstanding the water-furrows. Besides, these water-furrows must be neatly cleaned out with a spade, and made deeper in the places where they are intercepted by the crowns of the new ridges, otherwise they are of very little utility. Before ridges can be properly made straight, it is necessary therefore that the land be made level; but it is as dangerous to level ridges rashly, as to alter them before they are levelled: for if ridges are levelled too fast, and thereby a great depth of loose earth

thrown suddenly into the furrows, it will not be possible to convey away the water that falls upon them. The farmer should therefore consider the nature of the soil he has to deal with, before he proceeds to the altering old ridges; and if it be wet, to level the ridges very gradually.

In levelling ridges a great hollow is made in the crowns. This is occasioned by frequent successive cleavings, which is the method commonly used. It is obvious, that, by the first cleaving, a hollow is made in the crown of the ridge equal to the depth and breadth of the furrow which the plough makes; whereas the parts on each side of the ridge are but little levelled, and at each successive cleaving this hollow is made greater. Such a quantity of new earth immediately turned up, is not fit for vegetation. Besides, this hollow becomes so great, and the parts of the ridges on each side of it so steep, that it is impossible to plough them in a proper manner. In cases of this kind, when levelling is still thought proper, some furrows from each side must be thrown back by the plough into this hollow, by which a new small ridge is formed upon the crown of the old one, and then the remaining parts of the ridge may be levelled as before. Some persons, instead of this, plough across the ridges. This method serves the same purposes; it both throws some earth into the hollows, and levels the ridges; for the plough in going carries off some earth from every height, and leaves some in every hollow. But then land must not be left in this situation during the wet season, unless the water-furrows are drawn along the furrows, and also in some cases along the crowns; for unless this is done, the water that falls upon the field cannot be conveyed away. At the next ploughing, the whole old ridges may be levelled in the same manner as at the first ploughing; or, if thought more proper, may be divided into two equal ridges, ploughed in such a manner that the furrows betwixt them may be exactly in the crown of the old ridge, and the other furrows exactly in the furrows of the old ridge. By this means the old ridge is raised from the furrows, and levelled from the crown. This method of dividing the ridges into two, will be found very proper, either when winter-grain is to be sown, or when the barley-land has a winter-ploughing.

With regard to the placing of ridges when the land is wet, they ought to be with a view to the conveying away the water: but when dry, they should be placed with a view to the retaining the water. The common way of placing ridges where there is a slope, is along the declivity in a straight line from the top to the bottom; and land is commonly laid out with a view to this. Where the declivity is gentle, this is, no doubt, a very proper way of placing the ridges; but if the declivity be great, this way of placing the ridges allows the soil to be washed away by the rain. Therefore, in this case, placing ridges across the declivity is the most proper way; for when ridges are placed across, the water meets with many interruptions in its course, and does not run off with such violence as when placed along from top to bottom. But instead of this some farmers make the ridges very narrow. This serves the same purpose; for in proportion to the number of furrows, there is the less water in each furrow, and consequently it runs with less violence. But, placing the ridges in this manner is not so proper for this purpose as placing them across the declivity, nor so proper for retaining the water in a dry season.

If land be very dry, and in no danger of being damaged by the stagnation of water, the ridges ought to be placed across the declivity, as near the level as possible; for this retains both the water and the soil. It is obvious, that when ridges are placed in this manner, the water cannot get off by running along the surface, by which the soil is in great danger of being carried away. And when land is dry at the head of the ridges, and wet at the foot, and no proper fall for carrying off the water, as is frequently the case, the ridges should be placed in the same manner. For, in this case, every furrow in some mea-

sure retains the water that falls upon the ridge above, and thereby prevents it from sinking towards the bottom of the field, and lodging there.

This is likewise a very proper way of placing the ridges, even when the declivity is but small, if the land is in the situation mentioned, dry at the head, and wet at the foot. It must be owned, however, that this will not entirely answer the end proposed: for the water will penetrate the soil, and, when it is resisted by till or clay, will find its way along these to the bottom of the field. But this will not be so sudden as in the other way of placing the ridges: and the soil at the head, which is naturally dry, will receive more benefit from the rain as it falls.

In cases where land is wet, and the water can be conveyed away from the bottom of the field, the ridges should be placed across likewise; not directly, but with a small slope to a drain or furrow on the side of the field from top to bottom, by which the whole water is conveyed away. And where land is wet from the breaking out of small springs, this way of placing the ridges is also very proper; the furrows conveying away the water as it rises. Ridges placed in this manner for these purposes should not be altered.

However, where proper attention is first paid to the different means of draining, &c. many of the above directions will be unnecessary.

Different opinions have been maintained by farmers in respect to the direction, or way of placing ridges, in order to expose the land best to the influence of the sun and air: but this matter being not yet well determined, it is needless to pay any attention to the point; for where the placing of ridges makes no difference as to the wetness of land, we are chiefly to have in view the conveniency of ploughing and laying out the land in proper divisions.

There are three different methods of forming ridges by the plough: viz. gathering, casting, and cleaving. The 1st keeps the crown and furrows of the ridge in the same place in which they were before. The plough begins in the crown, and ploughs out the ridge, turning the earth towards the crown, where it entered. Every ridge is ploughed by itself; or, instead of this, the halves of two contiguous ridges may be ploughed together. By this method the ridge is higher raised than before. The 2d method keeps the crowns and furrows also in the same place in which they were before. The ridges are ploughed in pairs. The plough may enter in the furrow betwixt the ridges, and plough out the ridges, turning the earth towards the furrow, where it entered. Or, it may enter in the furrow on the right side of the two ridges, then turn to the one on the left, and plough out the ridges, turning the earth to these furrows, and from the furrow that is betwixt them. By this method the ridges are kept of the same height in the crown, and one of the furrows made a little higher, and the other a little lower than before. The 3d is the reverse of gathering. The plough enters in the furrow on the right side of the ridge, turns to the furrow on the left side, and ploughs out the ridge, turning the earth from the crown towards the furrows. Every ridge is ploughed by itself; or, instead of this, the halves of two contiguous ridges may be ploughed together. If the ridge has been raised in the crown, by this method it is made flatter.

A field being laid out in the manner judged most proper, in respect to the breadth and height of the ridges, should be ploughed in one or other of these ways, according to its situation. If the ridges are broad and high, casting will be found to be the most proper method; for this is the only way by which they can be ploughed, and kept in the same situation: cleaving will make them flatter; and gathering will raise them higher. If they are flat and narrow, cleaving will be found to be the best method. Cleaving flat ridges, and thereby turning the crowns into furrows, and the furrows into crowns, has these peculiar advantages: a field is much sooner ploughed in this way, than

in any other; and a quantity of fresh earth, at every ploughing, is exposed to the air, and employed in vegetation; and the ridges being kept level, are sown with exactness. Gathering is only proper when the situation of the ridge renders it too wet for winter grain.

SECT. IV. *Of the Methods of destroying Weeds.*

It is evident from the following circumstances, that weeds rob the plants we desire to cultivate, of their food; prevent them from branching out from the root, and lessen the vegetable pasture in the land where they are suffered to grow. They are nourished by the same food that would nourish useful plants; and therefore, when allowed to grow along with them, must rob them of part of their food. Although it be allowed that the food of all plants is not exactly of the same kind; yet, as plants draw their food from what touches their roots, it may be justly concluded that all kinds deprive the earth of that vegetable food which would nourish others. And experience convinces the farmer of the truth of this: for he finds, that his crop is bad in proportion to the quantity and kinds of weeds with which his land is infested. They also cover the surface of the land on which they grow; thereby confining the plants which are to be cultivated.

By some farmers it has, however, been attempted to be shown, that corn never wants room to grow; and that it is the want of food alone which makes some plants decay, when they are set too thick. If this be true, weeds can do no harm to plants, by covering the surface, and confining them while they grow. But let a person cast his eyes upon a plantation of any kind, and he will immediately observe, that where the plants are placed very near to each other, they stretch out chiefly to the length; and where they are placed at a greater distance, they grow not so much to the length, but more to the thickness, and branch out on all sides. So that the proportion of nourishment which the plants receive, makes them grow either to the length principally, or to the thickness, and branch out, according as they are placed near, or at a distance from each other. The same thing happens when there are many weeds growing amongst corn. Some fields are so much infested with weeds, that, though no grain is sown, the weeds come up very thick. This obliges the farmer to give plenty of seed: in consequence of which the surface is quite covered; and the plants of corn being confined by the weeds, instead of branching out from the root, and producing two or more stalks, as they are naturally disposed to do, push up one stalk only, that they may the more easily get above their rivals. The proportion of nourishment which they receive, makes them grow to the length, instead of branching out from the roots, and forces them to produce one stalk and ear only, instead of many. Experience confirms the truth of this; for when land is rich, and at the same time much infested with weeds, the plants of corn grow tall enough; but seldom have more stalks than one. There are some kinds of weeds which have great numbers of small roots, which they extend to a great distance. These roots bind the soil in such a manner, as to lessen the vegetable pasture; or rather make it difficult to enlarge it by tillage. When a field is much infested with quickening grass, the soil is so firmly bound together by the roots, that it is not possible to pulverize it. In ploughing, the earth of the furrow is turned over whole, and scarcely any impression is made on it by the harrow. Therefore it is of great importance to know how to destroy these useless and noxious weeds, that all the vegetable food in the soil may be applied to the nourishment of the useful plants which are to be cultivated, that these useful plants may have room to extend themselves, and branch from the root on all sides; and that the vegetable pasture, which is always lessening, may be enlarged more readily.

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Weeds, like plants, may be properly divided into *annuals* and *perennials*. But, in considering the methods of destroying them, they may be distinguished into such as are propagated by the seed, and such as are propagated by the root.

Of destroying weeds that are propagated by seed. The destruction of weeds is certainly one of the most important parts of husbandry; but it is a task of extreme difficulty, as they differ very much in their natures. The seeds of some of them will putrefy in a few years, if they lie moist in the earth, and are prevented from vegetating. But the seeds of others will lie many years in this situation, without having their vegetative power destroyed. This is obvious from experience. Land infested with different kinds of weeds, has been thrown out into grass, and allowed to lie only a few years; and some of the weeds have been found to be destroyed, when the land was broken up again; but though it lie twenty years, some other kinds are found, in as great plenty as ever. The first sort may be destroyed by turning the land infested with them, from tillage into grass, and allowing it to remain in that situation for a few years; and both sorts may be destroyed by bringing the seeds to vegetate, and then tearing up the young plants. By frequently stirring and turning over the land, both these points will be accomplished. For every time the land is stirred and turned over, some seeds, that before lay deep, are brought near the surface; the earth about them is rendered free and open; and the air, which is necessary to vegetation, freely admitted: besides, the plants that have appeared are thereby torn up and destroyed. Of the truth of this, every farmer that practises summer-fallowing is now fully convinced. For he observes, when the season is favourable, and his fallow is well and frequently ploughed and harrowed, and time allowed betwixt every ploughing and harrowing for the weeds to vegetate, that his land, for several years, is not so much infested with weeds as it used to be. But in the performance of the operations by which the land is stirred and turned over, to promote the vegetation of the small seeds, great care should be taken to preserve the sap or moisture as much as possible. This will be done, if, in stirring the land, the surface is made smooth and plain: for when the surface is rough and uneven, the drought has easy access; but, when it is smooth and plain, the winds have less influence, and the sap is better preserved.

The vegetation of seeds in land is also promoted by the application of dung and some other manures. If therefore dung be laid upon land infested with weeds, and the land carefully stirred and turned over several times, all the seeds in it, by degrees, will be brought to vegetate; and thus the weeds may be destroyed. But this practice, though proper for destroying weeds, may, in some cases, destroy some of the virtues of the dung, before it is applied to promote the vegetation of the useful plants which are to be cultivated. Therefore, though it may be improper to follow this method when seed cannot be sown for a considerable time after the dung is laid on, as is the case sometimes when summer barley is sown on fallow, yet it may answer very well when seed is to be sown soon after, as is the case when wheat is sown.

Manures can however only be employed as destroyers of weeds, in so far as they tend to promote the vegetation of the seeds.

It is necessary to observe here, that the seeds of some weeds, particularly the different species of thistle, are carried to a considerable distance by the wind; and where any earth is thrown up in such a manner as to entangle them, as at the root of a hedge, or side of a ditch, there they appear in great plenty. Many farmers allow them to grow there undisturbed; the consequence of which is, that their seeds are carried into the adjacent fields, and thereby great damage is done, which might have been prevented by cutting them down before their seeds were ripened. This is a circumstance which ought to be more attended to. The best and most certain method of destroying

thistles on grass lands, Mr Boys says, is to let them alone till they are in full bloom, and then to mow them with a scythe; for, if they are cut while young, they produce fresh shoots from the sides of each plant.

Of destroying weeds that are propagated by the root. Weeds of different kinds and natures are propagated by the root. Some of them infest the land that is in tillage, and others the land that is in grass. The first sort have such a tender blade, and such tender roots, that they cannot pierce earth that is hard; but are of a kind that increase very fast, when the soil is free and open; while the second sort have the blade and roots so strong, that there is scarcely any soil that, of itself, will become so hard and stiff as to prevent them from making their way through it; but are of such a nature as to be easily torn up when the land is free and open, and do not easily strike root again when thus eradicated.

With respect to the first sort, as they chiefly infest land in tillage, they may be destroyed by turning the land from tillage into grass, and allowing it to remain for some years in that situation. This is confirmed by experience. Land over-run with quickening grass, and other root-weeds of the same kind, is frequently laid down in grass, and allowed to continue for some years without being ploughed. This land, when broke up again, if allowed to lie in grass for some years, is found to be clean, and the roots of the weeds destroyed. The number of years necessary for destroying the roots, depends upon the nature of the soil. If the soil be naturally hard and stiff, it is the sooner brought to such a situation as to prevent the roots and blades of the weeds from piercing it. But, if it is naturally soft and spongy, it takes a longer time before it is brought to that situation. For while the blade or roots of the weed can pierce the soil, their vegetation is not prevented. In some soils it is six or seven years before the roots of the quickening grass are destroyed. The number of years that are found requisite for destroying these root-weeds, has, no doubt, been partly the cause of establishing the practice commonly followed. Three crops of corn are taken, and then the land is allowed to lie six years in grass, or lea. At the end of these, the farmer supposes that the lea is come to maturity, and fit again for being ploughed. When it is only two or three years old, it is called, in some parts of the country, *calf-lea*; and, if ploughed at that age, the roots are commonly very abundant.

But the sowing land with grass-seeds, instead of turning it out into lea, destroys the roots of these weeds some years sooner. For thereby a sward being brought immediately upon the surface, the land becomes firm, the blades of the weeds are unable to pierce it, and the roots are deprived of air. Ryegrass seed, or the common hay seed, is the most proper for this purpose. For the plants arising from these soon cover the surface, and, by the number and smallness of their roots, bind the soil. Clover, particularly the broad clover, is improper; for the roots of it being large, they open the soil in growing and extending themselves, and thereby prevent it from arriving at that degree of firmness necessary for destroying the weeds so soon as if no grass seeds had been sown.

In regard to the second sort, they may be destroyed by turning the land infested with them from grass into tillage; and it is not necessary to continue it long in this situation, for the weeds commonly disappear after the first ploughing. But as it may be inconvenient to turn a field infested with weeds from grass into tillage, or from tillage into grass; it is necessary to consider the methods of destroying these weeds, without altering the situation of the land. When land in tillage is infested with weeds, they may be destroyed by frequently stirring and turning it over in dry weather. For, the weeds being removed out of their places, the drought prevents them from striking root again. The stirring the land in wet weather is rather hurtful

than beneficial: for though the roots of the weeds are removed from their places, yet the weeds themselves are only transplanted. If the land be wet, they soon strike root again; and the quickening-grass in particular, having its pasture enlarged, makes quicker progress than ever. But, if the land be dry, the weeds do not so easily strike root again: or, if some of them should strike root, they continue for some time in a languishing condition, and, if removed out of their places while in that condition, are easily destroyed by the drought. If land then be frequently stirred and turned over, by degrees all the weeds may be destroyed: for, by every stirring or ploughing, such of them as are in a languishing condition are destroyed, and those that are strong and vigorous are enfeebled.

If land is to be freed from seed-weeds, it cannot be made too fine, nor the surface too smooth; for the more perfectly this is done, the greater number of seeds are brought to vegetate. But, when land is to be freed from root-weeds, it cannot be turned up in too large pieces, nor the surface left too rough: for the larger the pieces, and the rougher the surface, the drought has the easier access, and the roots are the more effectually destroyed and removed.

If land in grass be infested with weeds, and it be inconvenient to turn it into tillage, the weeds themselves must be pulled up by the roots, or frequently cut.

It has been suggested that the *yellow rag-weed* may be destroyed by pasturing the light lands on which it appears with sheep.

Some land, after being a few years in grass, is liable to be over-run with *fog*. This, it is supposed, is owing to the soil becoming soft and spongy near the surface. If this be the case, rolling, which makes the surface firm, may be of some use in destroying this pernicious weed.

A third sort of weed is found to infest both the land that is in tillage, and the land that is in grass. These have not only the blade and roots very strong, so as to be able to pierce the soil, though hard, but also of such a nature as makes it difficult to tear them up; or have their roots of such a kind, that they may be divided into a great number of plants. These weeds cannot be destroyed, either by turning the land infested with them from tillage into grass, or from grass into tillage: but they may be destroyed by the methods mentioned, where the situation of the land is not changed. If the land is in grass, they may be destroyed by digging them out, or by frequently cutting them: and if the land is in tillage, they may be destroyed by frequently stirring and turning it over in dry weather. But this work must be performed with ploughs properly made for cutting their roots.

There is a fourth kind of weeds that chiefly infests land that is wet. Frequent cutting, and even digging out by the root, have been tried to destroy them, but to no purpose. They are not to be seen on dry land, and, when on land only inclining to be wet, appear very weak. Therefore draining seems to be the proper method of destroying them.

In concluding this article, it must be observed, that all kinds of root-weeds, and many kinds of the seeds of weeds, may probably be destroyed by depriving them of air, as it would seem necessary not only to the vegetation, but also to the life of plants. And when land is in tillage, the weeds may be deprived of air, either by burying them deep in the earth, or covering the surface. Trenching accomplishes the one, and a good crop of peas, potatoes, or any other plants that lie thick on the surface, effects the other.

SECT. V. *Of the Uses of Manures, and the Means of preparing and collecting them.*

As the manuring of land is in all places a necessary part of husbandry; rich-land not yielding a long succession of crops without help, and poor land requiring it in the very outset of

its culture; it must be obvious that the easier this article can be obtained, the greater will be the advantages which a country receives from it.

In farming it should therefore always be a primary object to procure the greatest possible quantity of manure in the highest state of preparation, as the quantity of dung produced annually on a farm, from the consumption of hay, straw, and grain, by cattle or other ways, is frequently very insufficient for the insuring of full crops. This is a point which, however, has been too much neglected by those engaged in husbandry. Indeed no very advantageous methods of increasing the produce of this useful article have yet been proposed. The reservoir described by Mr. Pew in the Transactions of the Bath Society, seems however to be useful, where the situation will admit of its being made, for the purpose of collecting the liquors which flow from the houses of different animals. The cow-stalls, says the author, stand nearly on the top, but a little on one side of a nap, or hill; and by means of gutters behind, the liquor is carried into a sink which runs under the stable, where it meets, by the help of another sink, with the stable liquor; and these, together with the liquor of the pig-sties, run through an under-ground drain into the reservoir, into which Mr. Powell, the inventor of the contrivance, throws all kinds of weeds or other refuse vegetable or animal matters, where it of course rots. If the weather prove wet, he stirs it well by means of poles, then draws up the hatch, and by means of the trenches it is conducted to all or any part of the mead below, which mead is rendered almost incredibly productive by it.

It would probably be of more advantage to the farmer, to allow these liquors to be mixed with rich mould or other substances of the same kind, and thereby form a good manure.

It is a judicious practice to keep farm-yards, and places in the vicinity of them, well littered with haum, or inferior kinds of straw, which, by being trodden, and from receiving the urine of the passing cattle, soon become putrid, and form a good manure. The most desirable situations for this practice are those which are most completely overshadowed by trees or other means.

Different modes are employed in the feeding and management of horses and cattle with a view to the production of manure: some supply them with hay, and use all the straw for litter; while others consume all their hay and straw in feeding the cattle. By the latter mode the greatest quantity of manure will be produced.

The able author of a Treatise on the connection of agriculture with chemistry, observes, that food in its passage through the bodies of animals becomes mixed with animalized matter, and consequently more rich and valuable weight for weight, as a manure, than dung produced by the littering cattle; although these must necessarily be much less in bulk and quantity, from the large proportion of the food of animals which goes off by breathing and insensible perspiration: besides which, without the utmost care, it is extremely difficult to prevent the valuable juices of the dung from sinking through the floors of the cow-houses and stables, or the soils of farm-yards. Could these inconveniences be effectually provided against, says he, by a proper flooring of clay or chalk, a preference appears due to the consumption of the whole of the produce by cattle, provided that attention be paid to the mixing daily a sufficient quantity of peat or mould with the dung and urine, so as completely to absorb and take up whatever may remain of these matters in a fluid state. By this process, there can be no doubt that a greater quantity, and a still more valuable dung may be obtained, than by the other practice of a less number of cattle, and littering them with straw.

Stable-dung should only be kept a certain length of time: for,

when kept some years, it has been found inodorous and insoluble; consequently useless as a manure.

There is a difference of opinion among farmers respecting the propriety and advantages attending the use of long or fresh dung, or dung which is completely rotted. The above author supposes, that where the views of the farmer are to promote only the next immediate crop of grass or grain, the dung when applied should be fully and completely rotted; but that if his views extend to subsequent crops, or the soil be of a nature to receive benefit by the fermentation and heat produced by the application of fresh dung, preference should undoubtedly be given to dung in a long state, provided it be immediately ploughed in and totally covered, which is not easily accomplished with dung of this description. Long dung is however always to be preferred in the culture of potatoes; for dung completely rotted frequently causes this crop to be watery and warm-eaten.

It is observed by Doctor Anderson, that wherever the dung of sheep can be properly collected, as by folding, and judiciously applied along with lime, aided by a skilful culture and good management, it will furnish the means of gradually meliorating the soil, and rendering it productive of grass as well as corn in a much greater degree than has been generally supposed.

Lime. This and other calcareous matters the same author considers as the best kinds of manure that can be obtained for improving waste lands. Where this manure can be obtained in large quantity and at a cheap rate, there are very few soils so barren as, under a proper management, may not by degrees be very much meliorated.

But lime, on *poor* soils, continues he, is a trifling and inefficacious manure; unless where it is applied in *very considerable quantities at once*. A chaldron or half a chaldron *per acre*, says he, I should consider as nearly as efficacious in this case as sprinkling a pinch of snuff. Six hundred bushels of slaked lime *per acre* he considers as not an over dose; and less than three hundred he accounts too little in almost any case.

But to this, for a dressing for poor ground newly broken up from waste fields, in order to bring it into proper heart, he thinks fifty or sixty cart loads of yard dung, as much as two horses can properly draw upon ploughed land, should be added *per acre*.

When lime and dung are thus applied in the same season, they produce more powerful aggregate effects than if either had been singly applied; much benefit therefore results from this practice. Lime he thinks acts both as an alterative and a fertilizer. In its alterative capacity, it not only enables the soil to produce crops it never otherwise could have yielded; but it also enables dung to operate upon the soil in a manner it never otherwise would have done. Of the two, lime alone is better than dung alone, on unproductive soils.

The practice of applying these manures in *great quantities together*, is still more beneficial, where care is taken not to exhaust the soil after it has been thus enriched, before it is laid down into grass. This the Doctor considers as a fundamental maxim in farming.

In every case, the sooner the lime is laid upon the soil after it has been prepared, and the more quickly and intimately it can be blended with the mould, the better it will be on every account. For as the lime never acts till it becomes blended with the soil, and acts the more powerfully in proportion as this mixing is the more complete, it should be applied as early as possible, that it may have the full benefit of the subsequent ploughings for blending it thoroughly. For the same reasons, the lime should always be spread while it is yet in its dry and powdery state, and should be ploughed or harrowed in as soon as possible after it is spread, to prevent its running into clots by moisture, as these become afterwards stony masses that never can be properly divided. This circumstance is particularly mentioned,

because in this state it will not produce the same effect upon the soil, that half the quantity of lime judiciously applied would have done.

Marle. This is also both a very good manure, and one of the most lasting. The Norfolk marle is probably the best in quality, and the most easily obtained. It is of different kinds. Mr. Kent, in his Survey of that county, observes that twelve cart-loads to an acre, of the white, or rather yellow marle, will, the second year after it is laid on, change the nature of land; most of the exhausting weeds which impoverish the soil, and choke the corn in its infancy, being effectually destroyed; as it has a great tendency to keep land clean, and increases its fertility to a surprising degree: its benefit, though not to the effect it produces at first, is felt for thirty years, when a second marling, of about half the original quantity, may with propriety be used; but it has been found by experience, that it does best the second time compounded with muck or maiden earth. As it is of a ponderous nature, he thinks it suits best when spread on ley land, by which means it mixes sooner and better with the native soil. The other species of marle, or, more properly speaking, clay impregnated with marley particles, though good in quality, is certainly much inferior to the above, as it requires more than double the quantity to carry the same improvement. But he is inclined to think that this last is more durable than the former; not, however, from its quality, but from its mixing better with the earth, and not escaping downwards so soon as it does.

According to the Survey of Mr. Holt, marle is the great article of fertilization, and the foundation of the improvements in agriculture in Lancashire; and this earth, or fossil, is fortunately wanting but in few places in that county. There are several kinds of this article, valuable in proportion to the intrinsic quality of each, or the calcareous matter which it contains, or the nature of soil to which it is applied. To the stiff clay lands, the blue or reddish slate marle, full of calcareous earth, is more beneficial: but to the light sand lands, the strong clay marle is more genial. Thus not only a calcareous stimulus is given, but additional matter is afforded, to correct the nature of the soils, by loosening the texture of the one, or giving adherence to the particles of the other, by the opposite qualities of the different marles applied. Barren sand lands, and poor heaths, in the south of that county, have been, under the effects of marle, rendered productive; but this has been done at very considerable expence. Marle has also been tried as a manure after being burned, which may be in a kiln after the manner of lime, or laid over a gutter, under which faggots, &c. for fuel, have been previously laid. The best season is the summer for laying it upon the land, sometimes immediately after a crop of hay has been taken. Its effects upon the grass are soon visible, from the rich verdure it produces. Long experience has sufficiently proved the propriety of the general practice of the county; which is, to lay the marle upon grass lands—the older the better; the sward and grass united cause a fermentation and putrefaction, which seem necessary to produce a proper effect. In regard to the quantity laid on in this county, it is from two to three, or three and a half cubic roods, of 66 yards to every statute acre. It is however reckoned a better practice to have the marlings repeated with a gentle covering, than to use thick coats of marle in order to last a long time. It must also be observed, that the marle should partake both of one summer's sun, and one winter's frost, at least. After being exposed to the effects of the weather, in large lumps, it begins to fall, or melt; the particles appear unctuous and soapy, and the quality of the substance seems quite changed from its original state. Then, in the ensuing spring, it should be divided (the parts now separate with ease), and equally distributed upon every part of the surface. This is with facility effected by har-

rows, &c. after which it is usually ploughed under; but, if permitted to remain a year or two longer, the lands would be more improved in the issue, by the length of time given previous to the marle being ploughed in. But the marle does not produce its full effects upon the soil, till intermixed and incorporated by a repetition of ploughings and an intermixture of dung or other manures. Marle, Mr. Pitt also remarks, is much used in Staffordshire and in large quantity. But the improvement by marle there is believed to be much more adapted for tillage than pasture, and its good effects on corn-lands are long visible; and in the case of the thin light unimproved lands the benefit of marling he thinks must endure for ever, as it not only consolidates the soil, but gives it thickness and staple.

In Norfolk, Mr. Kent remarks that those farmers who live near the sea, have lately begun to make use of the small sand from the beach, which they lay in the bottom of their yards; and when their muck, which is laid upon it, is sufficiently rotten, turn up the whole and mix it together; but the more general practice is, to lay it a foot deep in the stables, during the summer, and to feed their horses with green vetches, in the stables; the dung of which being afterwards mixed up with the sand, makes a most excellent manure, as well for grass as arable land. In many parts of the kingdom great advantage may, he thinks, be obtained, by turning up the borders of corn-fields, and the banks of maiden earth in the roads, and mixing them with the common yard muck, which would multiply the quantity of manure in a very great degree without doing any injury.

The judicious writer just quoted, also suggests another means of increasing the quantity of manure, particularly to gentlemen who are in possession of parks, plantations, and lands in hand; which is, to cause a permanent fold, during the winter months, to be pitched, in some sheltered spot, near their woods, and to pen their store flock in it, giving the sheep the quantity of hay they are accustomed to have, in racks, in the fold, and littering it every night with fresh leaves of trees, with rushes, moss, or any other similar rubbish that can be collected. This turned up together in the month of April, and mixed with about one-sixth part of lime, rubble from old walls, or any sort of ashes, will make as good a sort of manure as can be laid on turnips—and the quantity will be very considerable. In one winter he has obtained in this way six hundred cart-loads from six hundred sheep.

A mixture of peat and lime, which has been suggested by Dr. Hinton, Mr. Kent considers as a manure very useful on clover when laid on early in the spring, which, in general, not only adds greatly to the crop of hay when mowed, but insures a good crop of wheat in succession: it is likewise peculiarly good upon sainfoin, and, he apprehends, well adapted for turnips: as to lime, his opinion is, that it is always best to compound it with some other substance, and with maiden earth in preference to any other substance.

Mr. Pitt, in his Survey of Staffordshire, observes that the muck and farm-yard manure in that county is generally laid on wheat fallows, or on land in preparation for turnips, but sometimes on young clover, pasture and meadow land; and that town manure is used with equal advantage either in tillage land, or upon turf. Lime is also much employed there, generally on tillage land, either for barley, turnips or wheat, and is said to be most advantageous when laid on in a quick state, soon after slaking, and to harrow it in when the land is dry. It is sometimes laid on turf land, and it is said with good effect.

Mr. Boys, in his View of the Agriculture of Kent, says, that in that county the dung of horses, cattle, and hogs, is mixed together in large heaps, and laid in the fields intended to be manured, usually on a layer of fresh earth, a foot or two in depth, dug out of hedge-rows, waste banks, or useless spots of

land. When the heap of dung is made up, some persons give it a covering of mould; and it is an excellent practice to keep it moist, and prevent evaporation. After it has lain a month or two to ferment, it is trenched over; and then, after lying a few weeks longer, it is fit for use. This manure is laid on the land at the rate of from forty to sixty cart-loads of twenty bushels each per acre. The principal part of this sort of manure is carried out for wheat or beans; but some farmers dung for barley, and others for turnips. Manuring with the sheep-fold dung is practised on fallow lands in the spring months, after barley sowing, for turnips; then on fallows or clover lays, for wheat; and when that season is over, the fold is removed to either wheat stubbles or turnips, in order to fold the land for the succeeding crop of barley or oats. Two hundred sheep will fold about an acre in a week; the value of which is from 20s. to 30s. in proportion to the time of the year; the last folding in the autumn, next to the ploughing for wheat, being the most valuable and important.

He also remarks, that chalk is used to great advantage as a manure on some wet stiff soils, having no calcareous earth; in quantity from fifty to eighty cart-loads per acre. Its beneficial effects are said to last twenty years; but there are many soils (indeed throughout the greatest part of this county, where chalk is in plenty) which derive no benefit from it. The best method of using it, is to spread it early in the autumn, in order that it may be thoroughly drenched with rain, and that the frost may have its full operation upon it; by which means it is well pulverized when the thaw comes on, and will mix the more readily with the soil, or earth.

He also says, that old grass-lands or wet sandy or clay soils, over-run with furze or rushes, are greatly improved by the application of this substance; and turf-ashes, if spread on poor chalky thin lands for turnips, at the rate of about twenty cart-loads of thirty bushels each per acre, will seldom fail to produce a good crop. Turf-ashes are also often used for wheat, and sometimes for other crops; but there is no application of them equally advantageous with that of using them for turnips.

Sea-weed is a most excellent manure, being a mass of vegetable matter strongly impregnated with salt. Immense quantities are sometimes thrown by the winds and tides on the different shores, whence it is carted to the land on which it is to be placed. In Kent, the principal method of using it is by mixing it in layers among the farm-yard dung in the mix-hills. It is of great use in helping to rot the dry part of dung carried out of the farm-yard in the summer season.

Another manure employed in Kent for hops is woollen rags. They are laid round the hills of hops, &c. The method is to open the hill, and place the rags, ready cut into small pieces, two or three inches square, close round the roots, a little below the surface of the land, and immediately cover them up with mould. A ton of rags per acre is the usual quantity, which is about two pounds and a quarter to every hill of hops: they cost from 4l. to 6l. per ton. For dry gravelly soils, this is a good manure, as the rags operate in the nature of a sponge, to retain the moisture in a dry season, and thereby support vegetation; but, on the contrary, in a rainy summer it is supposed they do great injury, by their retentive quality on the mould, which is highly destructive.

Mr. Pitt says, that bone-filings or shavings, from the Birmingham manufactories, are esteemed valuable manures for light tillage land in Staffordshire. And Mr. Holt informs us that bone-dust, or bones ground in a mill, have been used with success by William Mayor of Ashworth-Hall near Rochdale. He has two fluted iron rollers placed at the end of a corn-mill shaft, which grinds them expeditiously. It seems that he not only

applies them to his own grounds, but also disposes of them to different purchasers who wish to employ them.

The same writer also suggests, that near the sea good composts may be sometimes made of sand, lime, earth, dung, and sea-weeds, with a species of shell-fish growing upon the rocks. This is found to be an excellent manure for barley in some parts of Lancashire.

We shall now introduce the experiments of Mr. Henry Harper on manures, as detailed by himself in Mr. Holt's Survey of Lancashire.

"The following experiments, says he, of different kinds of manure will shew the difference of both the quantity and the quality of produce on the different kinds of land on my farm, on which I manured half an acre of eight yards to the rod with every kind of the following manures; and when made into hay, as nearly all alike as possible, I weighed one average square rod from every lot.

Lot the 1st. Horse, cow, and butchers dung, all mixed together, of each about an equal quantity, which lay in that state about two months, and then turned it over, and let it lie eight or ten days, and then put it on the land before it had done fermenting, and spread it immediately. This was set on in September 1793. The produce 3 stone 15 pounds per rod, at 20 pounds to the stone.

Lot the 2d. Horse and cow dung, mixed and turned over the same as Lot the 1st, and set and spread on the land at the same time. Produce 3 stone 14 pounds per rod.

Lot the 3d. Horse dung, turned over and set on the land the same as Lot the 1st. Produce 3 stone 13 pounds 8 ounces per rod.

Lot the 4th. Cow dung, turned over and set on the land the same as Lot the 1st. Produce 3 stone 13 pounds 8 ounces per rod.

Lot the 5th. Night-soil, coal-ashes, and cleanings of the streets, and about 40 measures of lime to every ton weight, and turned over while the lime was in its floury state, and not suffered to run to mortar, for then it is of little benefit; one part of this was set on in September 1793, the other part the middle of March 1794, but no difference in the crop to be perceived. Produce 3 stone 13 pounds per rod.

Lot the 6th. Night-soil, coal-ashes, and cleanings of streets, set on the land in the same manner and times as Lot the 5th, and no difference in the cropping part. Produce 3 stone 2 pounds 8 ounces per rod.

Lot the 7th. Marle fresh got, and mixed with an equal quantity of horse and cow dung, and lay about three months and then turned over, and lay a month and then turned over again, and put on the land in six or eight days, and at the same different times as the two last lots, but no difference in the cropping. Produce 3 stone 8 pounds 12 ounces per rod.

Lot the 8th. Water from a reservoir that all the urine from the stables, cow-houses, and all drainings from the dung-hills, farm-yard, hog-styes, and all the waste water from the house runs into, and is carried on the land in a watering-cart made on purpose that holds four hundred gallons; and the water was put on the land in April, about 12,000 gallons to the acre of 8 yards to the rod; and again in May 12,000 more. Produce 3 stone 5 pounds per rod.

Lot the 9th. Blubber, the offal of whale-oil, mixed with soil, and set on the land the 1st of April 1794. Produce 3 stone 2 pounds 8 ounces per rod.

Lot the 10th. Soot, sowed on the land the middle of April 1794. Produce 3 stone 1 pound per rod.

Lot the 11th. Plaster of Paris (gypsum) sowed on the land in April, the weather then showery and favourable for it. Produce 2 stone 2 pounds per rod.

Lot the 12th. No manure at all. Produce 2 stone 2 pounds per rod: so much for gypsum, that has been made such account of.

Lot the 13th. Soap-ashes or muck, set on in March 1794. Produce 2 stone 10 pounds per rod.

Lot the 14th. Lime, set on in March, clean by itself. Produce 2 stone 8 pounds per rod.

An improvement by way of experiment upon Lots the 1st, 2d, 3d, 4th, and 5th, water from the reservoir put on these lots the beginning of May 1794, at the rate of 12,000 gallons per acre. Produce 4 stone 8 pounds per rod.

"Now, says he, these lots are all in one field, which is old meadow land all of one quality, the soil 11 inches deep, and a strong loam betwixt sand and clay with a reddish cast, and is what I call fox-land; and under the soil is a black loam sand, six inches deep, and then marle of four yards deep, and bottoms on a red sand. I approve most of the manure the five first lots were manured with, although it comes higher; they require the least labour, which mostly pays the best in the end, although it appears that some of the other lots afford more clear profit; but the most profit comes from that manure that continues its strength the longest in the land.

"The most clear profit I experience is from Lot the 8th, water from the reservoir, which is no cost, but labour, and that not so much as any other kind of manure; but it will not answer put on in hot dry weather (for it burns up all before it), except it was to be kept constantly wet, of which the supply is mostly scarce at that time.

"Lots the 9th and 10th. Blubber and foot I would not put on land for meadowing upon any condition, for the hay is bad; and, by a constant use of them, they exhaust the land, so that it will not produce any thing at all; and they are only manures for just the crop, with little or no after-grass.

"Soot is good for wheat, and other spring corn, if it is sown in showery weather.

"Lot the 11th. Gypsum is of no use on my farm, neither for corn nor grass.

"Lots the 13th and 14th. Soap-ashes and lime: they do not answer on my farm; they keep me too long out of the profit. What they might do in time, I have not experienced; but I always think the quickest return pays the best, so that the manure is not exhausting to the land.

"The water from the reservoir paid not amiss, which was set on the five first lots, which was an equal improvement of 2l. 10s. 8d. per acre; and if the extra labour was to be charged, it would be a discount of fifteen shillings, which would reduce it to 1l. 15s. 8d. clear profit per acre."

For the calculations of the different profits arising from the use of these different manures, we must refer the reader to the Survey itself, being too extensive to be introduced here.

The following observations on the proper season for laying dung on lands are given in the Survey of Lancashire, on the authority of the same experienced farmer: "If cow-dung, the fresher the better, provided it be the proper season for putting it upon the land; which is, if meadow, from the time of getting the hay off the land, till the middle of October. For, if the grass has done springing, the dung lies exposed all the winter to rain, snow, frosts, and the vicissitudes of seasons, which exhaust the strength, so as to destroy much of its good qualities: if it cannot be accomplished in autumn, then the ensuing spring; and if the season should not suit, the strength of the manure will be reaped the ensuing crop. He recommends turning over the dung previous to its being put upon the land, and to lie till it begins to ferment; then to carry it upon the land, and even spread it before the heat be gone off, by which the dung takes to the land the better. He prefers mixing cow-dung, horse-

dung, butchers-dung, and night-soil, together, in preference to each separate; and this mixture is in its best state from six to eight months old."

There are many other substances which may be employed in order to bring land into cultivation, as top-dressings. The principal of these, and which are most generally in use, are lime mixed with rich black mould, lime mixed with peat, peat-ashes, coal-ashes, and foot. The refuse or waste articles in different kinds of manufactures may also be applied in this way with advantage, when they can be procured in sufficient quantity. On this point the Earl of Dundonald remarks, that such adventitious aids or helps to a farm are of a nature that answers a much better purpose as top-dressings to grass lands, than for lands which are constantly kept under the plough. The application of top-dressings has, he says, been too little attended to, in consequence of farmers being unacquainted with the resulting advantages to ground, when converted from pasture to arable, by previously promoting the most luxuriant growth of perennial grasses. By assisting the vegetation, and increasing the vigour of perennial plants, their roots are made to strike deeper down and improve the staple of the soil: with annual plants the same benefit is not to be expected, as their growth and decay are limited to one season. Were manures exclusively applied under a system of convertible husbandry to grass grounds, the lands would regularly be broken up, in due rotation of cropping; and there can be no doubt but that a greater quantity of corn and herbage would annually be produced: and it is very probable, he thinks, that wheat and other grain would be less liable than at present to diseases, many of which, there is reason to believe, are occasioned by the immediate application of dung previous to sowing the ground. He considers top-dressings, especially to meadows and pasture ground, as the best mode of applying manure. This practice seems to be well understood in this country; but it cannot become general, unless the lands of farms be kept under a regular course of tillage and pasture.

Mr. Pitt, in his View of the Agriculture of Staffordshire, observes, that composts, consisting of shovellings of soils, scrapings of roads, scourings of ditches, mud from pits and ponds, used alone, or mixed with lime or dung, are generally used for a top-dressing, for meadow and pasture land; the ashes of the culinary fires are used in the same way; coarse pastures are improved by being mixed with night soil; foot is used as a top-dressing on wheat and other crops. In Kent, Mr. Boys says, this last article is employed in this way for sainfoin, clover, lucern, and meadows. It is sown on the land at the rate of forty or fifty bushels an acre, early in the spring. Coal-ashes are also used in the same manner in this county, at the rate of four or five chaldrons an acre, for the purpose of improving cold wet clay meadows.

In Lancashire, Mr. Holt says, marle has been burned in a common oven, and been found to answer as a top-dressing at about ten bushels per statute acre, after being bruised into a kind of powder, and sown with the hand. With respect to the application of lime alone to the surface of the soil, Doctor Anderson observes, that although, when laid on in *very large quantities*, it may have a sensible effect in sweetening the pile, and augmenting the quantity of produce also; he knows that the effect of it will be so much greater when mixed with the soil, that it is only in very particular situations that it can ever be an economical practice to apply it to the surface only; and never, he apprehends, where the soil is of a retentive nature. In this last kind of soil, he advises digging the ground and mixing the lime with the mould.

But where the soil is not retentive, and stones are abundant, there is not a necessity for digging it up: under these circum-

stances lime may be sometimes applied on grafs with profit; but in this case it will always be advisable, first, to mix the lime with some good mould, if it can be got, in the proportions of nearly two parts of earth for one of lime, and incorporate them well together by frequent turnings during the course of several months: for in this way it is found that lime, applied on the sward, operates much more powerfully than it ever does when so applied by itself.

SECT. VI. *Of the Preparation of Land for Cropping.*

As ploughing is one of the principal means of accomplishing this purpose, it is necessary that the stones and such other obstructions as may be liable to retard the progress of this operation should be first cleared away. This may be performed in various ways, as by digging, blowing with gunpowder, &c.

Another circumstance which impedes the preparation of the ground for cropping, is the wetness of the land: this inconvenience is to be remedied by draining, the means of doing which we have already noticed. This difficulty may however in many instances be removed, without having recourse to the more expensive processes of draining, by means of the plough, and a proper construction of the ridges, as has been already shewn.

There are various other means of preparing the ground for crops, which must be considered in this part of the work.

The process of *Fallowing*, when judiciously managed, may in some instances be employed as a means of improving and rendering land proper for the reception of crops. This practice is however by no means so frequent as formerly. Mr. Kent, in his account of Norfolk husbandry, seems to think the idea of leaving land to rest, is ridiculous: Keep it clean, says he, and intermix the crops sown upon it judiciously, so that one may fertilize as much as another exhausts; and it may be sown, as a garden is planted, from one generation to another.

But Mr. Boys, in his View of the Agriculture of Kent, seems of a different opinion. In East Kent, he informs us that fallows are made on poor lands, more or less, as occasion requires; in some cases, to get the land clean from weeds; and in others, where weeds do not abound, to make a good tilth for a crop of wheat, if a stiff, and barley, if a light soil. On the very worst soils, where wheat is never sown, fallows are frequently made for oats or barley, and for getting land into fine tilth for rye-grass, or other seeds. When any kind of soil has borne three or four crops of corn in succession, and is become full of weeds, a well-made summer-fallow he thinks requisite, not only to destroy the weeds, but likewise to meliorate and invigorate the soil: It is, says he, the most certain cure, the speediest, and, in the end, the cheapest.

The soils which most require fallowing are the stiff and wet, which will not admit the operation of the ploughs and harrows but at certain intervals, when the land is between wet and dry. Opportunities of working such soils are frequently lost by bad seasons; in which case, weeds will undoubtedly increase, and it is then impossible to eradicate them but by making a good summer-fallow, or what is by some called a fallow-crop, viz. cabbages, or winter-tares; neither of which will perhaps turn to so good an account in the end as a complete summer-fallow. The cold wet clays of this county, says he, even if they are tolerably clear from weeds, are subject, after two or three crops, to run together; and they then become so exceedingly stiff and cold, that, without the intervention of a summer-fallow to meliorate the soil, very poor crops only are to be expected; whereas, when a good fallow is made, an abundant crop of wheat, and two or three good crops of spring corn, are frequently produced.

It is further observed, that a good summer fallow is the best preparation for a crop of clover; and that a clover-lay, of all the tilths known, is the best for every other crop. But to sow clover on moist

soils, without a previous fallow, is a certain method of running the sand to couch-grass. In order to make a good fallow, he says that all kinds of soils should be ploughed about five inches deep before Christmas; and as soon as the land is tolerably dry in March, it should be cross-ploughed about six inches deep. Stiff soils must be left rough until meliorated by rain, and then worked fine when between wet and dry; and all light soils immediately harrowed close after the plough, in order to promote the vegetation of seedling weeds, that they may be destroyed by subsequent ploughings, which must be repeated two or three times more, at intervals, as opportunities occur, during the months of May, June, and July; every time reducing the land fine immediately after each ploughing, while the land is moist, for the purpose before mentioned, of promoting the vegetation of weeds. Particular care should be taken not to touch the land, either with the plough or harrows, when it is the least wet, as that only kneads it together, and creates more work to reduce it; besides locking up many of the seeds of weeds within the hard clods, and thereby preventing vegetation; by which such seeds are reserved for mischievous effects in the subsequent crops of grain.

In preparing waste lands in this way, Doctor Anderson thinks that it ought to be an invariable rule to make the *second* ploughing as deep as the nature of the soil and other circumstances will admit. If the sub-soil be retentive, and the stratum below of a good quality, especially if it be better than that which lies on the surface, it ought on this occasion to be opened up to the depth of twelve inches at least; and if it be to fourteen or sixteen inches, the soil being still good, so much the better. On ordinary occasions, however, a moderate depth of ploughing is generally sufficient.

There are other means, such as *Paring and Burning*, which when practised with caution, may be employed in order to bring land into a state fit for the reception of crops.

Of all the improvements in the cultivation of land that have been hitherto made in Kent, says Mr. Boys in his Survey of that county, this stands foremost; some of the very worst land having been made to produce excellent crops; and poor chalky downs, of scarcely any value in their original state, are by paring and burning made to produce good turnips and clover, and crops of corn, often equal in value to double the fee-simple of the land. Instead of the land being injured by the operation, as some theorists imagine, provided it be under a proper system of management and fairly dealt by, it is put into a progressive state of improvement from the time of its surface being burnt. It has frequently happened, that land, after burning, has been sown with corn four or five years in succession, without being folded with sheep, or any part of its produce ever returned in manure; even charlock and other weeds have been suffered to remain, by which it has been annually burthened with a double crop: hence it has been left in an impoverished state, and the burning is unjustly condemned for the mischief done by the negligence and rapacity of the cultivator. But let the land, when burnt (continues he), be perfectly cleaned from charlock and other weeds, by growing turnips until the weeds are totally eradicated by hoeing, &c.; let the turnips be fed off the land, by sheep lying on the land day and night; then sow it with barley and clover; the latter to be fed off with sheep, folding them on the land for wheat. Lastly, return the straw produced upon the land in manure mixed with clay or loam, or any other fresh earth that is near at hand, for a second Norfolk rotation, which may be repeated; or the land may be sown with sainfoin, to remain till a turf is formed fit for paring and burning again. This plan being pursued, the practice of burning the soil will not give any cause of complaint, either to landlord or tenant. Theorists exclaim, that, by paring and burning, the staple of the land is reduced, and the soil is wasted; which may

be somewhat true: but all this is very immaterial, if fine crops of corn can be produced where none ever grew before, and the land at the same time be improved.

The method of paring moss in use in that county, he says, is with downshare or breast-ploughs, taking off a turf as thick as the nature of the soil will admit, from half an inch to two inches; the thicker the better, provided there be a sufficient portion of vegetable matter contained within it, to make it burn well; the expence for paring it a moderate thickness, where the land is not very flinty, is 20s. per acre; for laying it up in heaps and burning, 10s.; and for spreading the ashes, 3s. A coat of manure is thus produced on the land, of from eighty to one hundred and sixty cart-loads per acre, for the trifling expence of 33s. A hundred cart-loads of dung, purchased from neighbouring towns and villages, at the distance of three miles from the land, would cost, carriage home included, ten times the price of downsharing, and yet would not improve the land more. But, where the land is well covered with turf, it may be ploughed for burning, about two inches deep, with a common plough, drawn by a pair of horses, early in the spring; and as soon as a drying wind sets in, the turf may be laid in heaps, and burnt by labourers for 1l. 1s. per acre; which will produce near two hundred cart-loads.

The ingenious Doctor Anderson also remarks, that it is an undoubted fact, confirmed by the experience of many practical farmers, that on many poor soils a crop may be thus obtained much more abundant than could be obtained without it. This fact, and it is an important one, is admitted even by those who oppose the practice. It is well known by every practical farmer, that an abundant crop of any kind, under judicious management, is one of the most certain means of laying the foundation for future crops; and in cultivating waste grounds, it is a great point gained to obtain a good crop at the commencement of the operations.

Mr. Marshal, in his *Rural Economy of West Devonshire*, also observes: "From what I have seen in this county of the effects of *sodburning*, I am more and more convinced that in many cases, and under discreet management, it forms a valuable part of British husbandry, and may become an instrument of real improvement in places where it is not at present known; especially in bringing the *waste lands* of the island into a proper course of cultivation."

In order to the improvement of moor land, the first thing to be done is to divide it into proper inclosures; not only to secure the future produce, but also to be a means of procuring rich earth to cover the otherwise insipid useless mould on the surface, and give root to the plants which may afterwards be cultivated in them. Then, as the natural produce of this earth is of little value, its surface should be pared off, in order to be burnt: but in doing this, the husbandman should be very careful not to make the clods too dry, or light his fires in too dry a season, lest they should extend farther and deeper than was intended. If the depth of the moorish earth be not very considerable, the surrounding ditches, which make the inclosure, will afford the rich strong soil, which should be spread about three or four inches thick all over the surface. When the clods are burnt, their ashes should be mixed with this new soil. If no proper earth can be got from the ditches, sand or gravel may be used with success, as was practised by the ancients, as gravel is singularly beneficial to such lands.

By the Berne Society, who recommended this method of improvement as founded on repeated experience, it is very properly observed, that the good effects of the sand and gravel will be considerably increased by a moderate mixture of dung, and that, especially if the ground be intended for ploughing, this covering should be at least a hand's breadth in thickness. Dung alone would undoubtedly be extremely efficacious on all such

soils, in which it is remarked to be of longer service than in any other; but the farmer can seldom spare a sufficient quantity of it to go far enough unmixed, nor indeed for mixing. In this case, other ingredients must be resorted to; though the sand or gravel will generally do great things without any mixture. Well preserved ashes will be of excellent service, and so will the rubbish of old buildings, or any other similar substance, when mixed with the sand or gravel, even of the coarser kind, and incorporated with this naturally rich earth, which, were its real value known, and the proper method of treating it rightly understood, might claim a preference before any other soil. Loam is still better than either sand or gravel. This should be brought on before the fires are lighted to burn the surface of the moss, and should remain in heaps till it can be equally mixed with the ashes. Lime, where it can be had, will also contribute to the meliorating of mossy grounds. When moorish earth is thus covered, it is fitted for various kinds of crops.

SECT. VII. *Of the most advantageous Course of Crops for different Soils.*

THE articles of culture are commonly divided into two classes: one consists of crops that are said to exhaust and impoverish the land they grow on; the other such as ameliorate and improve it. This must be understood in a comparative sense; for, properly speaking, there are few, if any, vegetables that are carried off the land they grow on to be consumed elsewhere, but in some measure exhaust and impoverish the soil, and render it less fertile and less capable of supporting vegetation.

The first, or those which are supposed to exhaust the land most, are fibrous-rooted plants, as wheat, barley, rye, oats, &c. The second, or the ameliorating, includes all the leguminous and tap-rooted plants, as beans, peas, vetches, turnips, parsnips, carrots, clover, &c. Modern improvements are much increased by a judicious succession of interchanges among those articles. An ameliorating following an exhausting crop, prepares the land for another exhausting crop, and especially if it be a hoeing crop; for by judicious management the land may be constantly cropped for many years in succession, without the intervention of a fallow every third or fourth year, as has been too much the practice till lately.

Doctor Anderson remarks, that no crop succeeds better on harsh unmellowed soils than turnips. Perhaps it thrives better on these, with a sufficiency of manures, than on those soils that have been long under cultivation. This is therefore the best crop for the *first* on all newly broken-up wastes that are not of too clayey a nature. It not only mellowes the soil, even perhaps more than a fallow, but affords a great deal of dung, which is an article of inestimable value under these circumstances.

In Norfolk, Mr. Kent in his excellent Survey observes, that the management and course of cropping are generally fixed under a six-course shift, viz. wheat the first year—barley or oats the second, without clover—turnips the third—barley or oats, with clover, the fourth—the clover mowed for hay the fifth—and the sixth grazed till midsummer, and then broken up for wheat in succession. The farmers, however, frequently endeavour to contract it to a five-course shift, by sowing their wheat upon clover of one year's lay; and in some of the best parts, some tenants carry on only a four-course shift: thus, wheat, turnips, barley, and clover. This last is similar to the practice of great part of Flanders, where the invariable method is to carry an alternate crop for man and beast; but as land, though ever so good, will grow tired of a too frequent repetition of turnips and clover, some inconvenience is occasionally sustained; to remedy which, they will do well to change the former of these now and then for a vetch crop, and the latter for trefoil or lucern. No course of husbandry can be more profitable than this, where the soil will allow it; and there are many parts of

this county where it may be carried on without doing any injury to the land. He considers the five-course shift to be more unfair than the four; because, in this case, there are three crops of corn to two crops for the animal. This mode of cropping would be better, if the barley crop, after wheat, was sometimes changed for buck wheat or potatoes, which would neither be an unprofitable or exhausting crop; and thus a little varied, the practice of a five-course cropping might be allowed, in the parts where the soil is good in quality; or where any extra-quantity of manure can be procured, which is sometimes the case in the vicinity of towns, or near sea or river navigations, or where a gentleman occupies a park with a farm, or a farmer a large portion of down. But in the great western parts of the county, the course of six shifts ought to be strictly adhered to: and there is something very rational in this six-course husbandry upon a light soil; for though the exhausting and fertilizing crops do not follow alternately, as in the four course shift, yet there is an equal number of each observed in the rotation. He thinks, however, that in the very light parts of the county, a seven-course shift would be an improvement; but he does not mean by letting the land remain three years laid, as some have recommended, because the Norfolk land does not yield much profit from grass seeds after the first year; but he would rather recommend the following course: wheat, vetches, barley, buck, turnips, barley, clover; this would keep the turnips and clover crops at such a distance, that there would be no fear of their success; and, as the buck might be considered as a neutral crop, the alternate advantage would not in fact be lost in its good effect. He believes too, that by means of the vetches, which might be fed off the whole summer, more stock would be kept on very light land, than from the present six course shift; and where a flock is kept, it never can be employed so well, as in penning upon this sort of light land, as soon as the wheat or rye is sown, especially if the sowing be upon one ploughing; in such case, it is best to begin rather early, and sow by degrees as many ridges each time as the breadth of the fold will cover or contain.

The author of the very useful Survey of the County of Kent observes, that the general system or plan of management in the Isle of Thanet, on all the thin light soils, has been, time out of mind, one of four courses, viz. fallow, barley, clover, wheat; but subject to several variations, which have much increased of late. The soil having been greatly improved during the last fifty years by excellent management, it is found that the course may be extended to advantage by substituting pease for fallow, thus: pease, barley, beans, wheat, and then return to a fallow as before: and sometimes, though but seldom (and then generally considered as bad management), a crop of barley is taken after the wheat, thus: barley, beans, wheat, fallow.

But it is to be understood here, that the foundation of all good management, and the system most practised, is the first mentioned of four courses; and it is by this system, with the plenty of manure from the sea weed, that great part of this island, which is naturally as poor land as any in the kingdom, is made to produce such excellent crops of corn of the best kind.

He further remarks, that the deep rich sandy loams, and some of the best of the land at the west end of the island, are cultivated under the round tilth system of East Kent, viz. beans, wheat, barley.

The following is the process under the four-course system: after raking up the stubble of the wheat, and stacking it near the farm yard for littering hog-pounds, thatching, &c. to plough the land five or six inches deep as soon as possible in the autumn, which is cross-ploughed when the land is tolerably dry in the spring, and repeated two or three times during the summer months. Between the times of ploughing, collections of mould, farm-yard dung, sea weed, &c. are formed in conve-

nient situations in the fields, which are turned over in the autumn, and in frosty weather carried out on the fallow, at the rate of from forty to forty-five cart-loads per acre. This manure is spread and ploughed in as soon as opportunity offers; and the barley is drilled in at the rate of three bushels per acre, or sown broad-cast four bushels per acre, the first dry week in February or March; and if for clover or trefoil the next year, those feeds are sown with the barley: the clover or trefoil lies only one year, and is ploughed about five or six inches deep in November, and sown with wheat. But where no seeds are sown among the barley, the stubble is ploughed in about six inches deep in the winter, and harrowed the first dry week in February; and then beans are drilled in furrows eighteen or twenty inches apart, at the rate of four bushels per acre; the furrows are harrowed, and the land generally rolled down smooth. As soon as the beans appear they are horse-hoed, and sometimes immediately harrowed across the furrows; and then, as soon as they have recovered the harrowing they are hand-hoed with a hoe about five inches broad, at each side of the furrow, which operation is repeated in May, or the first week in June. The ground is then stirred with an earthen plate, in order to raise a quantity of mould against the stems of the plants.

When the beans are harvested, the land is scuffled with the broad share, and made perfectly clean by harrowing and burning the weeds, if any, and then ploughed for wheat. In both cases, whether clover-lay or bean-stubble, the wheat is usually sown three bushels per acre, after having been steeped in salt water from five to twelve hours, and mixed with flaked lime. When pease follow the wheat, they are drilled in, and managed in every respect the same as the bean-crop, except harrowing after the horse-hoe. The barley and other crops after pease, are managed the same as if the land had been a summer-fallow, instead of pease. Under the round tilth system, the bean and wheat crops are managed the same as before mentioned; but the barley is usually sown later, in order to give time, by thrice ploughing, to clean the land; and the manure is generally spread on the barley-stubbles for beans.

The chalky lands of East Kent have not yet received any settled plan of management, those that are commonly practised being very bad. The best system of cropping for these Mr. Boys conceives to be

1	2	3
<i>Down-land, burnt.</i>	Downshare Turnips	Downshare Turnips
Turnips same year	Turnips	Turnips
Barley	Barley	Barley
Clover	Clover	Sainfoin.
Wheat	Wheat	
Turnips, &c.	Fallow.	

In these the burnt turf produces turnips almost to a certainty; and by folding these off with sheep, much manure is left on the land, and a stout crop of barley and clover obtained; the clover being again folded off, a good crop of wheat is produced, and the land is in a gradual course of improvement.

The loamy soils are usually under the round tilth system of barley, beans, wheat.

Here the barley is a cleansing crop, by being first ploughed in winter, and then twice or thrice more in dry weather in the spring before the barley is sown. Some farmers, whose land is very clean, plough only twice, and then drill the barley in April, in rows from seven to ten inches apart, hoeing and hand-weeding the intervals. Four bushels are sown broad-cast, and from two and an half to three drilled per acre. Barley is mown, and after lying a week or two, is bound in sheaves, and set up into shocks of ten at a place, to be tithed. When the wheat-sowing is over, and the dung intended for beans is carried out, the barley stubbles are then ploughed in.

The beans are put in rows, from eighteen to twenty inches apart; if boxed in, four bushels per acre; if drilled or dropped by hand, three only; the crop is horse and hand-hoed; and the whole, with the succeeding wheat crop, is managed as in the Isle of Thanet.

But the strong cledge soil is generally under a four course system of fallow, oats, clover, wheat; or, fallow, wheat, clover, wheat.

On this land the oats and clover are sown, in a dry season, in March; the clover is generally fed with sheep, and folded for wheat, which is sown early, that the work may be finished before much wet weather sets in. If the fallow is cropped with wheat, it is sown the end of October, or beginning of November; the clover-seed in that case is sown on the wheat in the spring, and covered with a roll only; for this soil is generally too much pulverized with frost to admit harrowing at that time. The clover is fed off by sheep, as before mentioned, and the crops of wheat and oats are harvested as on the other soils which have been described above.

Mr. Boys says, that the hazel mould is under different systems at different places, according to the fancy of the farmer, or situation of his land. Some pursue the Norfolk system of turnips, barley, clover, wheat; others the East Kent, of barley, beans, wheat; and others again peas, barley, clover, wheat: and some sow early pease and turnips the same year. But this sort of soil being dry, and very easy tillaged land, may be managed as well under one course as another. If the occupier has with it a tract of grazing land, he finds turnips and clover convenient, and pursues the Norfolk system; on the other hand, if he has no grass-land, or has the corn-tithes himself, he finds it most advantageous to pursue the East Kent system. The methods used for sowing and harrowing the several crops, are the same as before mentioned.

For the stiff clays on the tops of the chalk-hills a four-course system of fallow, wheat, beans, barley, is pursued; and a very good one he thinks it is for such a soil. The fallow gives an opportunity of getting a fine early wheat season, which is very necessary on this cold backward land. The wheat stubble is ploughed soon in the winter, by which the frost brings the surface into fine order for drilling the beans as soon as the land gets dry in the spring. The beans are horse and hand-hoed to keep the land clean for the barley crop, which is put into the land at two ploughings only. The corn is harvested in the same manner as on other soils, but is much later than on any other kind of land.

The dry loamy soils about Sandwich, Faversham, and Deal, are cultivated in the round tilth system of barley, beans, wheat. And a few oats are sown instead of barley, and pease instead of beans; and sometimes a crop of canary is sown on the bean-stubble instead of wheat. The barley is sown or drilled on the third ploughing, at the end of April and beginning of May: the quantity of seed sown, and other management, the same as on the loamy soils of East Kent. When the land is manured, the dung is generally laid upon the barley-stubble for beans, at the rate of forty or fifty cart loads per acre; when ploughed, the beans are drilled, or dropped by hand, from three to four bushels per acre; the crop is frequently horse and hand-hoed three times each, and always kept perfectly clean from weeds. It is harvested as in other parts; after which the land is ploughed once entirely flat, and sown with wheat chiefly in the month of November; and the crop carefully hand-weeded in the summer months.

But the stiff wet clay of the lower parts of this district is much of it under a two-course system of beans and wheat alternately. The beans are always put in rows, twenty inches apart; they are frequently planted by women dropping them by hand, while a man follows and covers them with the loose

mould which he cuts and draws from the next furrow, with an instrument called a planting-hoe. Wheat is sown broadcast before the rainy season commences in the autumn; and this land is laid in flat ridges of half a rod or a rod in width: after sowing, the ridge-furrows are opened, to let off the water in winter season. And the best of these stiff wet lands are often sown with canary instead of wheat, and garden-beans are planted instead of common ticks; these are the windfor and toker beans, which are dropped by hand, at the rate of six bushels per acre, in rows twenty inches apart. They sometimes produce very abundant crops, and great profit. Both the bean and canary-crops are kept clean by repeated hoeings.

In the Isle of Shepey, Mr. Boys says, the general rotation is beans and wheat alternately; and when the land gets foul, or the farmer thinks it wants rest, he substitutes a fallow for the bean-crop, which is done once in six or eight years. On the gravelly parts they sow a few oats, and sometimes barley. Some turnips are sown; but from the land holding the wet so late in the spring, they are of little use to the grazier. Much clover is sown with great success; and the lay is the farmer's favourite tilth for the wheat. The land is ploughed in the winter for beans. The beans are drilled in rows, about twenty inches apart, as soon as the land will admit of it in the spring; they are horse-hoed twice, and hoed and weeded by hand once. The beans are harvested as in other parts of the county, and the stubbles are ploughed only once, and then sown with wheat in October: the land is laid in flat ridges, with open furrows, to carry away the water in winter. The crops of wheat and beans are generally very fine.

It is necessary to observe that the clover that is sown here is mown twice; the first time for hay, and the second for seed; and this stiff soil, with a good harvest season, frequently produces great crops of very excellent feed.

The chalky soils of the upland farms of West Kent, when under the plough, are cropped with turnips, barley, clover, and wheat, for one, two, or three courses, and then laid to sainfoin or rye-grass for a few years; after which the same course is again followed. On the clay soils, where they have settled systems and favourable seasons which admit the pursuing them, the courses are fallow, wheat, clover and trefoil, wheat; fallow, wheat, clover and trefoil, oats; fallow, wheat, oats, pease.

And on the hill above Wrotham, &c. Fallow, wheat, clover, wheat, oats. But they frequently sow sainfoin or rye-grass for a few years, and then break up with a fallow, and pursue the same course again.

And on the gravel and sandy soils, turnips, barley, clover, wheat; turnips, oats, clover, wheat; turnips, barley, clover, wheat, oats; turnips, barley, clover, pease. This is dry land, and ploughsight.

On the hassock, or stone-shatter soils, one of the following systems is generally practised, turnips, barley or oats, clover, wheat, pease; or turnips, barley, clover, wheat, beans, wheat.

The coomby and pinnacky soils are nearly under the same system as the clay.

But the hazel-mould is frequently managed with four courses: turnips, barley, clover, and wheat, with variations of substituting oats for barley, and pease for wheat; and sometimes after wheat and clover-lay, a crop of pease. And the gravelly soils are often cropped with early pease, then turnips the same year, succeeded by oats, clover, and wheat, in succession. Sometimes rye and winter-tares are sown, to be fed off with ewes and lambs in the spring, and then followed by turnips, &c. But much of the best land of the vallies is under a system of six courses; viz. turnips, barley, clover, wheat, beans, and wheat. And for turnips, on the chalky and other

poor soils, the land is ploughed in the winter, and cross-ploughed in a dry time in the spring, as in many other parts, and generally manured with farm-yard dung, and mould from hedges and ditches, before the third or fourth time of ploughing, unless manure is carried out for the preceding crop of wheat; for without the land is in good heart, the poorest sorts, especially, will not produce good turnips. They are fed off with sheep, and the land, if it is stiff, is sown with oats on one ploughing; and if light and kindly for barley, that grain is sown instead of oats; for which the land is sometimes twice ploughed. The clover-seed is sown on both crops before the last harrowing; a great part of the clover is mown for hay, and then fed off the remainder of the summer, when it is ploughed once and sown with wheat; for which crop a clover-lay is esteemed here on these soils, as well as in other parts, the best tilth that has yet been discovered.

But the stiff red clays and coomby soils are always summer-fallowed for wheat; and when these sorts of land are laid down with seeds, they are sown with rye-grass, clover, and trefoil; they continue two or three years, and are then ploughed in the winter, and made a summer-fallow for wheat, with the same course as before.

Such sandy and gravelly soils as are intended for turnips, are frequently sown with rye, which is fed off with sheep previous to sowing the turnip-feed. This may be of great advantage to the sheep, should there be a scarcity of food in the spring; but it must tend to exhaust the soil, and weaken the turnips, unless the sheep get great part of their food by day on grass-land, or other feed, and go to the rye by way of folding the land at night: or if the land is to be manured for turnips, there is no fear of a crop; in that case, the sowing of rye may be excellent management; and indeed every plan is excellent on these soils that tends to secure good crops of turnips; for that is the very essence and spirit of good husbandry. And not only the manure of the sheep in feeding off the turnips on these loose lands, but the treading of their feet is of great advantage.

As the stone-shatter, loamy soils, and hazel-mould, are of a light dry nature, they may be worked almost at any time. These are made into good tilths for turnips, and frequently produce fine crops without any manure. The sooner the turnips are fed off, and the land sown, the better the produce in general of barley and oats.

Near London, rye and winter-tares are sown in great quantities for spring-feed for early lambs; and they are fed off in good time for a crop of turnips.

When the seasons admit, the following are examples of the rotation of crops in the county of Mid-Lothian in Scotland, as stated by Mr. Robertson in his survey:

1. For a rich loam.

1st year, summer fallow, without dung.	5th year, barley, ground thrice ploughed.
2d — wheat.	6th — clover.
3d — beans and pease, the land dunged.	7th — oats.
4th — wheat.	8th — summer-fallow, &c. as before.

2. For rich heavy lands.

1st year, summer-fallow, dunged.	5th year, barley.
2d — wheat.	6th — clover.
3d — oats.	7th — oats.
4th — beans and pease.	8th — summer-fallow, &c. as before.

3. For a hilly district.

1st year, turnip, well dunged.	4th year, oats.
2d — barley, or oats.	5th — turnip, well dunged, &c. as before.
3d — clover.	

4. For a dry soil.

1st year, potatoes, well dunged.	4th year, oats.
2d — wheat.	5th — potatoes, well dunged, &c. as before.
3d — clover.	

This practice is followed on several farms on a dry soil in the neighbourhood of Edinburgh.

SECT. VIII. Of Wheat.

THIS grain is less particular in respect to climate than most other kinds. It not only thrives in temperate, but also in very hot, and very cold regions. In general, wheat, however, succeeds best upon strong soils, especially if they have been well drained, so that the corn lies dry: but still some sorts of this grain thrive better in some soils than in others.

The most advantageous mode of cultivation for this valuable grain is probably not yet fully ascertained. It may however be profitably sown either after preparing the land by fallowing, or after crops of turnips, potatoes, &c. and on ground from which a crop of clover has been taken.

Various sorts of wheat are cultivated in different parts of the country. But the writer of the Survey of Kent observes, that the old sorts of wheat, cultivated in that county, are the *brown* and *yellow lammas*; the *white straw*, *Fulham*, and the *white* or *egg-shell*. But that the *brown lammas*, which till lately was the sort chiefly grown, is now giving way to a variety of new species, as well as some of the other old sorts. From some experiments made by Mr. Boys, it has been found to be the least productive of the several kinds.

It is the common brown-strawed wheat, which grows with a long jointed ear, the chaff of a dark brown colour; the straw long and apt to fall; the hull or bran thin, the flour very white, and the corn mellow in grinding; for which reasons it is esteemed by the millers as the best of the old sorts for their purposes. The *yellow lammas* resembles the *brown* in every respect, except that the colour of the grain is of a yellow hue, and the chaff of a somewhat lighter colour. And the *white strawed* wheat takes its name from the colour of its ear; in other counties it bears the appellation of the *Kentish white straw*. This kind sends out a greater number of stems from the stool, or plant, than the other sorts; and by that means is often a very thick crop on the land. The straw is generally somewhat shorter than that of many other kinds, and not quite so liable to fall in rainy seasons. It is on these accounts much sown in the eastern part of the county: but, from its dull colour, its having a thick bran, and often grinding very steely, the millers do not seem to approve of it. The *Fulham* also produces a white straw, which grows short and coarse: this kind is very productive, especially on poor land; but the grain is very coarse, and the bran thick: from which circumstances it is by no means so valuable to the millers as the other kinds.

White, or *egg-shell* wheat, is known by its producing a white straw, a smooth white chaff, and very white grain; the bran of which is somewhat thick, but the flour remarkably white. It works mellow in grinding, is very early ripe, and so free in the ear as to blow out in windy weather. This kind, from rich sandy loams, is often a beautiful sample, in which case it brings the highest price of any of the different sorts. He says that the new sorts of wheat, which have been introduced into that county within these last twenty or thirty years, are the *hoary white*, the *nonpareil*, the *pilbeam*, the *square ear*, and the *hoary brown*. The *hoary white*, by some called the *velvet eared*, is by far the most valuable, because it is very productive, and the best for the miller's use. The straw is white and short, the chaff is covered with a thick fine down, somewhat of a brownish hue; the grain is remarkably small, and of a dull white colour; the bran very thin, so that some grains are almost transparent

when held up to the light. It grinds very mellow, and makes a beautiful fine white flour. From the quantity of down upon the chaff, and its small ears binding up very close in the sheaf, this kind, in a rainy season, is apt to vegetate very freely in the field; on which account it is not so proper to cultivate in a moist climate, and in small inclosures, that are not open to the sun and winds.

The *nonpareil* is a kind said to be brought into this country from America; it has a bright straw with a brown ear; and the grain is very white, large, and plump. It is very productive on all soils, thrashes very free, and yields, in that operation, the greater part of its chaff; thereby producing a great quantity of horse-meat. It grinds very mellow, and the millers consider it as a good kind.

The *pilbeam* is a brown wheat, growing very stiff, and generally thick on the land. The grain is small and plump, somewhat of a yellow brown. It is said to be very productive on rich lands, and is a valuable kind to mix with others, but will not of itself make a good loaf of bread, from its not working properly in the act of fermentation. The *square eared* wheat is a very productive kind; but, from its being apt to drop out in the field before it is ripe, and consequently to blow out in gales of wind, is not much cultivated. The *hoary brown* is but lately introduced, and therefore its properties are yet little known. But besides these sorts, Mr. Boys observes, that there are two kinds of *riquet* wheat, the *white* and *brown*; however, neither of them are much cultivated. They both ripen late in the season, and are so very coarse and steely as to be unfit for making bread, unless mixed with a large proportion of a better sort of flour. They, however, produce very abundant crops on strong wet lands.

The best time for sowing wheat would seem to be about the beginning of September, especially if rain has fallen; as it is a general practice among farmers to make choice of a time for sowing their wheat when the earth is moist, and writers on agriculture have also in general recommended the practice. Mr. Boys remarks, with respect to Kent, that the time for sowing wheat on the wet and cold lands is early in October: on stiff cledge and drier clay soils somewhat cold, about the middle of that month; but that the general time for the county is the month of November. It, however, sometimes happens, by badness of weather and other untoward circumstances, that a considerable quantity is sown the first week in December; but that the more early sowings generally produce the strongest crops.

It must also be observed, that early sowings require less seed than late ones, as the plants then rise better, and acquire strength to resist the severity of the winter. More seed should always be allowed for poor lands than for rich, because a greater number of plants will perish on the former. Rich lands, when sown early, require the least seed of any. There is also another circumstance which the husbandman should carefully attend to in sowing, which is, that his estimate of seed be formed, not from the capacity of any particular measure, but from the number of grains which that measure will contain; because the grains of some growths of wheat are much larger than those from off other lands, though of the same species, and perhaps equally good. By not considering this, the ground must frequently be sown too thick, or too thin; though farmers are seldom apt to run into the last extreme. Instead of the usual allowance of three bushels of seed-wheat to an acre of land, repeated trials have shewn that half that quantity is generally more than sufficient: It is a common practice to sow more seed upon new broken up ground, than upon that which has been long in tillage. From half an inch to three inches is the usual depth at which wheat is planted, according to the nature of the soil; the stiffest lands requiring the shallowest sowing. The general custom is, to sow it under furrow, which is certainly most advisable, if the soil be shallow, to prevent the

plants being thrown out by the winter's frosts, or their roots being left bare by the drying winds in the spring. Some sow in broad-cast, either with a single cast, or double bout, harrowing once between; after which the ground is again harrowed several times, till the seed be well covered. In this manner of sowing, however, a great deal of it will become the prey of the birds. And in planting the corn deep, there is great danger of its being eaten off by worms between the grain and the blade of the grain.

In the agricultural Survey of Norfolk, it is observed that wheat there is partly dibbled and partly sown broad cast; but that the former is not in so high estimation as it was some years since. The writer is however of opinion, that when wheat is planted upon clover or on'y one year's lay, it is the best practice, especially if the dibblers are well looked after, for in this case it will admit of a saving of a bushel of corn to an acre, and the corn is generally better bodied, and somewhat heavier.

Mr. Wagstaff, however, dissents from the above writer in respect to dibbling being not in so high estimation as some years since: "It is," says he, "I believe, true, that, in certain districts of Norfolk, dibbling, properly speaking, is somewhat lessened in its manual practice—as, to save the expence by hand, many farmers have adopted spiked and drill rollers, imitative of the procs pursued in real dibbling; while this is a confession to and confirmation of the utility of dibbling, its manual practice, where hands are easily procured, doth not appear to be lessened where it hath been long adopted, while it is annually diffusing in an adjoining county, and is become a subject of experiment in other counties. Indeed, what this gentleman has said, that wheat so planted is better bodied, and consequently heavier, is true, in fact, while a saving of seed is acknowledged: these, with the clover or grassy leys, being pasturable to the hour of ploughing, while the inverted turf is a certain manure, and forms, as it were, a matrix for the nourishment of the embryo seed, which, to admiration, dilates its shoots, covers its allotted space, and each shoot has its culm or stem, the ear of which is more replete in number, and with a larger grain than arises in the broadest process: and it may be remarked, that where certain holes have carelessly been passed without seeding, the parallel rows on each side have tillered forth their branches, whereby there hath not been an apparent deficiency, nor, perhaps, much of a real one: certain it is, in general, or with rarely an exception, that lands of the foregoing description, thus dibbled, with a saving, at least, of a bushel of seed per acre, are productive of more than the quantity saved, and that grain specifically weightier than from equal land, after repeated ploughings, when sown broad-cast, produces."

Mr. Varlo also reports, on the authority of many farmers who have employed this method, first, that the produce is more by ten or twelve bushels an acre than by the former method, particularly if the set wheat is hoed. Secondly, that it is less liable to misfortune, such as lodging, after heavy rains, mildews, &c. Thirdly, that the straw is stouter and the grain bolder, consequently would give the best price. Fourthly, that employing so many poor children, parish rates would be less.

"If this method," says he, "was become general, it would save an immense quantity of seed, and keep the poor employed from February to May; and as experience has proved, past contradiction, the great utility of setting wheat in so extensive a manner, might not the scale be extended—even through the three kingdoms?"

Mr. Kent says, that in Norfolk, when wheat is sown upon one year's lay, it never has but one ploughing; and when it is sown upon a second year's lay, it seldom has but two. The old practice was, to break up the second year's lay soon after the spring grass was eaten off; but now it is seldom touched till

after Lammas; and then the best way is just to pare up part of the sward by a sort of half ploughing cross the ridges, just curling the ploughed part over the unbroken part, in an inverted state, and, when the turf is deadened, to cross-harrow it; and at the wheat-seeding to plough it up, in the straight way of the ridges, to its full and proper depth. The turf by this means falls to the bottom, and operates as an assistant manure. In respect to this practice, he thinks that the farmer should take care not to be too late; as it has been remarked, that, as near the time as possible that nature sheds any particular seed, it always grows with more certainty, and therefore less seed is required, when sown early, than when sown late: about Michaelmas is the height of the season in this county; and it never should be delayed above a fortnight after that period.

The best mode of weeding wheat, is probably by the-hoe, which, when used early in the spring, before the ground is covered by the blades of corn, will effectually eradicate all the weeds, especially if done in dry weather; because being small, they then soon wither and die. When the ground happens to be very full of weeds, it may be necessary to go over it a second time, about a fortnight after the first, to cut up those weeds which may have been too small to be noticed. By this means the corn will be kept clean, freed from robbers, which would deprive it of due nourishment, and there will not be time for new weeds to grow so as afterwards to do it any great prejudice: for the ground will be so much shaded by the corn, that the weeds will thereby be kept down in such manner as not to ripen their seeds before the harvest season.

Both M. Duhamel and Mr. Miller justly blame the practice of those who either turn hogs in among their wheat, to destroy part of it when it grows too thick; or sheep to eat it down, when they think it too rank. The absurdity of the former is self-evident: and in regard to the latter, it is well known, from long experience, that the leaves, or blades of corn, are necessary to draw in nourishment from the air and dews, for the increase of the stalk and ear. To be thoroughly satisfied in this, Mr. Miller cut off the leaves of some plants of wheat, alternately, early in the spring, and always found the stalks of these plants much smaller, the ears shorter, and the grain poorer, than those of the intermediate plants whose blades were not cut. Several experiments made by M. Duhamel have also proved, not only that all plants are impeded in their growth, and rendered less perfect in their productions, but often even killed, by stripping them of their leaves: and this is confirmed by Mr. Miller, who adds, that he has frequently observed in gardens, that plants divested only of their lower leaves, plucked off by ignorant persons upon a supposition of their drawing the nourishment from the head, have been greatly weakened thereby. The same will undoubtedly hold good with respect to corn: besides which, cattle, and particularly sheep, often bite so close as to destroy the crown of the plant whence its future growth should proceed.

Wheat may be said to be ripe when its straw is turned yellow, its ears hang, and are destitute of greenness in the middle of them, and the grain is hard on being bitten. It was formerly a custom among farmers, to delay reaping their wheat till it was very ripe. But they now mostly reap it earlier, and do not let it stand to be so ripe as formerly. They indeed find their account in cutting it greener; for such wheat has a better colour than that which is thoroughly ripe, and consequently sells for a higher price. It is also probably heavier in the bushel.

A produce of from four to five quarters an acre is reckoned a good crop: but it can hardly be credited how much beyond this the produce of good ground, thoroughly well cultivated, may be increased. Mr. Miller assures us that he has known

eight and ten quarters, and sometimes more, reaped from an acre, over the whole field, where the corn has stood thin upon the ground; and that he has been informed by persons of great credit, that even twelve quarters have been reaped from an acre of land drilled and managed by the horse-hoeing husbandry.

The most favourable season to get in harvest, is afforded by hot and dry weather; as the quality of the corn is improved, and the grain rendered much fitter to keep, by the sun's having acted powerfully upon it, either towards the latter part of its standing, or just after it has been cut.

SECT. IX. *Of Rye.*

THIS is a kind of grain much cultivated in some of the northern counties. It is distinguished by farmers into two kinds, the *winter* and *spring* rye, and in some parts of the country by the names of *black* and *white*, or *Dantzick* rye.

The *winter* rye is the largest grain, and is what the generality of farmers cultivate. It is usually sown in autumn, or at the same time as wheat; and in some of the northern counties, they are frequently mixed and sown together; but this seems to be bad husbandry, as the rye ripens much sooner than the wheat. Rye is generally sown on poor, lime-stone, dry, gravelly, or sandy soils, where wheat will not thrive, and in such places it does very well. The ground should be dry when it is sown, as in wet seasons it is liable to rot in the earth. It rises in a much shorter time than wheat. If sown upon light land, it ripens much earlier than on cold stiff ground, and by continuing to sow it in such a soil during two or three years, it will be forwarded so much as to ripen a month earlier than that which has been long raised upon strong cold ground. For this reason, those who are obliged to sow rye toward spring, generally provide themselves with this early seed. A little sprinkling of dung or mud, though it be but half the quantity commonly used for other corn land, will, if laid upon the rye ground, greatly advance the crop. The allowance of seed is commonly about two bushels to a statute acre.

The *small* rye is sown in the spring, about the same time as oats, and generally ripens as soon as the other sort: but if the season prove wet, it is apt to run much to straw, and the grain is generally lighter than the other. The chief use of this sort is for re-sowing land where the autumnal crop has failed.

Rye is ripe when its straw turns yellow, its ear hangs, and its grain is hard. If this grain be cut in perfectly dry weather, and be destitute of weeds, it may be housed almost as it is reaped.

The principal use of rye is for bread, either alone, or mixed with wheat, in which it is called *meslin* corn. If sown only for dressing of land, it is of vast service to the ground where it is ploughed-in green and succulent. This plant is likewise sown in autumn to great advantage, purposely for green food for cattle, particularly for ewes and lambs in the spring, before there is plenty of grass. When this is intended, the rye should be sown soon, that it may have strength to furnish early fodder. In this way it supplies the want of turnips where they have failed, or where their season is over: so that in such cases, it is very good husbandry to sow the land with rye, especially where there are flocks of sheep which cannot be well supported without green food early in the spring.

SECT. X. *Buck-Wheat.*

THIS will thrive in any kind of land, even in the poor sandy soils, but grows largest in light dry ground which has been well ploughed. When raised for its grain, a bushel of seed is sufficient for an acre of land; but when it is intended for green fodder, which is the use made of it in many places,

some farmers sow three or four bushels on an acre, in order to have a thick crop. The common time of sowing it is about the beginning of May; it may however be sown considerably later: but if it be sowed somewhat earlier, and a warm season ensues, it will bear cutting twice in the summer. The method of ploughing buck under, and the after management of buck-fallows, is nearly as for wheat, and the harvest process is like that of barley. This grain is an excellent food for pigeons, poultry, hogs, rabbits, &c. and is found to make horses thrive when given among their oats; but for these purposes it should be first bruised in a mill. The flour of buck-wheat is very white, and when mixed with a little wheat-flour, the poor in some countries make bread of it.

In Norfolk, Mr. Kent says, this grain is introduced after the barley that follows the wheat, and is frequently succeeded by wheat; but this is reckoned bad husbandry, and ought not to be allowed, unless it be ploughed under for manure, or unless the wheat-stubble which follows it be turniped.—The best mode of introducing it is after wheat, instead of barley, when it may be housed as a crop, and then to turnip the buck-stubble. This last is good husbandry, as it does no sort of harm to the land, and is an excellent forerunner to turnips, which generally grow kindly after it. If the soil be tolerably clean, and the buck be intended to be ploughed under as a manure, it is sown on one ploughing: but, in general, the ground is broken, as for barley or peas, to forward the fallow, and secure a crop. The seed-process is the same for both intentions; excepting that, for a crop, the seed is sown first; namely, immediately after barley-seed: and that intended to be ploughed under, is sown as soon afterwards as the ground is in a state fit to receive the seed. It is universally sown above furrow. In Suffolk it is usually sown with grass-seeds for laying down land, and for that purpose it is preferred to most other kinds of spring-corn.

SECT. XI. *Of Barley.*

THIS kind of grain is generally sown either after a fallow, or on an erse or second crop. If after a fallow, the land must be ploughed at least three times; and at the first ploughing, it should be laid in small ridges, and in that manner remain during the winter for the frost to mellow it: but if another ploughing can be given it in January, or in the beginning of February, the ground will be still much better broken and prepared. In March, these ridges should be split, the ground well harrowed and laid as smooth as it can be, and, if possible ploughed again the same day, in order to sow. But in strong wet lands, the best way is to lay it round, and make deep furrows for the purpose of draining off the water.

Some farmers at the time of twifallowing in June, make the land very fine, and sow it with turnips, which they feed sheep with in the winter: and in March plough it up, and order it as before; but others who take this method of sowing turnips, give it only one ploughing in March, just before they sow. And those who sow barley upon an erse, after wheat, plough up the wheat stubble in as dry weather as they can, as soon as the time of sowing wheat is over. They lay three ridges into one, if they have dung to spread upon it: but if they have not, they plough it in small ridges, that it may be the drier, and the better mellowed by the frost: they then plough it up again in March, and order it as before. Some sow their barley on small ridges, and others on broad lands; when the latter are used they cannot be laid too round.

Clover may sometimes be advantageously sown with barley; but this practice is not suitable for poor light soils. As the clover in wet seasons is frequently liable to overpower the barley, it has been advised to sow the clover a month after the barley, by which means it is prevented from being too rank.

In Norfolk (Mr. Kent observes) the barley, after turnips, is generally sown upon a third ploughing, and the grass seeds with it; and as the ground has been effectually cleaned by five ploughings the preceding year, it is generally in a fine state when laid down in this way.

Different sorts of barley are known, but the *spring barley*, which has a double row of beards or awns standing erect, is the sort principally cultivated in England, of which the farmers make two sorts, viz. the common and the *ratb-ripe* barley: but the latter is only an alteration of the common barley, occasioned by being long cultivated upon warm gravelly lands. The seeds of this, when sown in cold or strong land, will, the first year, ripen near a fortnight earlier than the seeds taken from strong land, therefore the farmers in the vales generally purchase their seed barley from the warm lands; for if saved in the vales two or three years, it will become full as late in ripening as the common barley of their own product: and on the other hand, the farmers on the warm lands are obliged to procure their seed barley from the strong lands, otherwise their grain would degenerate in bulk or fullness, which, by this change, is prevented. This sort of barley is easily distinguished by the two orders of beards or awns, which stand erect; the rind is also much thinner, and consequently better esteemed for malting.

Another sort, the long-eared barley, is also cultivated in many parts of England, and is a very good kind; but some farmers object to it, because they say the ears being long and heavy, it is more apt to lodge. In this sort of barley the grains are regularly ranged in a double row, lying over each other. It has no beards or awns, is very thin in the rind, and esteemed for the process of malting.

The *sprat*, battledore, or Fulham barley, is a kind which has shorter and broader ears than either of the former sorts; the awns or beards are longer, which tend greatly to preserve it from the birds, and the grains placed closer together. This seldom grows so tall as the other kinds, and the straw is coarser.

Winter-barley, *square-barley*, *bear-barley*, or *big*, is seldom cultivated in the southern parts of this country; but in the northern counties it is frequently sown, as being much hardier than the other sorts. There are two kinds of this barley, the one with four, and the other with six rows of grains. The grain is large and plump, but the rind thicker than that of either of the preceding sorts, which renders it less valuable. These last two kinds of barley are generally sown in the autumn, about the same time with wheat. In Kent only two sorts of this grain are cultivated; the common *long-eared English barley*, and the *short-eared sprat-barley*; the latter is only sown on some of the richest parts of the soil, where the common kind is likely to grow too stout, and fall. The quantity of seed usually sown in the common way is four bushels per acre; but if a drill plough be used, three and a half is enough.

The usual time of sowing barley is in March, April, or the beginning of May. It is generally thought most advisable to sow light lands the earliest, and to embrace the first dry season that offers for the purpose; dry weather being best for most summer corn. Clayey grounds, and lands subject to weeds, generally produce the best crops when sowed late.

The most suitable soil for barley is that which is dry and healthy, rather light than stiff, but yet of sufficient tenacity and strength to retain the moisture. On this kind of land the grain is always the best bodied and coloured, the nimblest in the hand, and has the thinnest rind. These are qualities which recommend it most to the maltster. If the land be poor, it should be dry and warm; and when so, it will often bear better corn than richer land in a cold and wet state.

The common method is to sow the barley seed with a broad-cast at two sowings; the first being harrowed in once, and the second

until the seed is buried; the common allowance of seed is four bushels to an acre: however, if the farmers could be prevailed upon to alter this practice, they would probably soon find their account in it; for if a third part of that quantity be sown, there will be a much greater produce, and the corn will be much less liable to lodge. This saving of seed corn is a very considerable object. But if the drill method were employed, it would be still greater, for in that case an eighth part of the seed would only be required.

From the great success which has attended the setting and drilling of wheat in Norfolk, some farmers have been induced to try these methods with barley, which seemed to answer very well on rich lands, and on others they would probably be found equally advantageous, if proper attention were paid to the practice, as the grain is certainly finer when cultivated in this way.

In respect to the choice of seed it is necessary to observe, that the best is of a pale lively colour, and brightish cast, without any deep redness, or black tinge at the tail. If the rind be a little shrivelled, it is the better; for that slight shrivelling proves it to have a thin skin, and to have sweated in the mow. The necessity of a change of seed, by not sowing two years together what grew on the same soil, is not in any part of husbandry more evident than in the culture of this grain, which, if not frequently changed, will grow coarser and coarser every year that it is continued. But in this, as well as in all other kinds of grain, the greatest care should constantly be taken to have the seed full-bodied.

In many counties the *steeping* of barley before it is sown is not practised. It is however supposed by some farmers, that seed-barley may be benefited by *steeping*; though *liming* it is generally prejudicial. A small quantity of foot mixed with the water in which it is steeped, seems of service in preserving the seed from insects.

When the barley is sown and harrowed in, the ground should be rolled after the first shower of rain, to break the clods and lay the earth smooth; which will cause the earth to be closer to the roots of the corn, and be of great service to it in dry weather. This may be done by the *spike-roller* with great convenience. And when the barley has been up three weeks or a month, it will also be a very good method to roll it over again with a weighty roller, which will press the earth close to the roots of the corn, and thereby prevent the sun and air from penetrating the ground, which will be of great service in dry seasons. This rolling of it before it stalks, likewise will cause it to tiller out into a greater number of stalks, and if the plants should be thin, make them spread so as to fill the ground, as well as strengthen the stalks.

When this grain grows too rank, as it sometimes does in a wet spring, mowing is much better than feeding it off; as the scythe removes only the rank tops, whereas the sheep feed upon all indifferently, and are even particularly fond of the sweet end of the stalk next the root, consequently may injure the growth of the plant, by biting it too closely.

This grain is ripe when the red *roan*, as the farmers call it, or the reddish colour on the ear, is gone off, when the ears droop and fall, as it were, double against the straw, and the stalks have lost their verdure. Barley should never be housed till thoroughly dry, lest it mow-burn, which makes it malt worse than if it had spered in the field.

SECT. XII. Of Oats.

This kind of grain is very hardy, and will thrive in almost any soil. There are several different sorts of this grain cultivated in England, as the *white*, the *black*, the *brown*, or *red*, and the *naked* oat. The white is the most common in the southern part of the country; but the *black* oat is more cultivated in the northern, and is esteemed a very good food for horses.

Red oats are much grown in Derbyshire, Staffordshire, and Cheshire. They are a very hardy sort, and yield a good increase, especially on strong lands. The straw of these oats is of a brownish red colour, as is also the grain, which is very full and heavy, and esteemed a better food for horses than either of the other sorts. The *naked* oat is not common in the southern parts of this country.

In the county of Kent, the *large Poland*, the *Bruc*, the *Tartarian white*, the *Siberian*, the *Devonshire black*, the *red* and the *grey* oats are chiefly cultivated.

The time of sowing oats is February or April, according as the season proves early or late, and it may always be right to sow the largest grained sort the earliest.

Oats are frequently sown after a crop of wheat, rye, or barley: in which practice the common method is to turn in the stubble, with one ploughing, about the beginning of February, and sow the seed with a broad-cast at twice, harrowing it in once after the sowing, and five or six times after the second, observing to draw the harrow once or twice across the furrows, to break the clods and cover the seeds: but at the other times to harrow in the same direction as the furrows, lest the stubble should be raised on the surface. But it would probably be much better husbandry to plough in the stubble in autumn, that it may rot in winter, and to give the land another ploughing and a good harrowing just before the oats are sown. This will render the ground finer, and fitter to receive the grain, and the increased produce would amply repay the extraordinary expence of tillage. It is also necessary to observe, that oats, which impoverish the ground, should always succeed some one of the meliorating crops, by which means a more plentiful crop will be produced than in the common way.

When oats are sown upon lay, or on ground newly broken up, as is frequently the case after only one ploughing, given in January, when the earth is moist, to turn down the sward; the harrowing must be in the same directions as the furrows, or but very little across, for fear of raising the turf. But this is bad husbandry: for the ground would be brought to a much better tilth for other grain, as a preparation, for which this sowing is chiefly intended, by giving the sward time to rot before the oats are sown.

Black oats thrive better in a moist soil than the white sort, and being a hardier plant, may be sown a month earlier. The white, which prefer a dry land, and will do well on gravel and sand, are the best of all grain for ground subject to quick-grass or weeds, because it may be ploughed later for them, and they rise sooner, and top the weeds better than black oats. The weather cannot scarcely be too dry when white oats are sown. The red and the white clayey soils, when in good heart, carry moisture enough, and are very fit for this kind of grain. The common allowance of seed oats is four bushels to an acre, but less may probably be sufficient.

In Kent the *Poland* oats are sown, about four bushels and a half per acre, from the beginning of February to the middle of May; and the first sown, if the land be in good order, are constantly the best sample, and generally the largest crop. There are also many white oats cultivated there under different names, as the *Essex*, the *Hertfordshire*, the *Twin* oat, &c. which are probably only different kinds of the *Bruc* oat. It is an early sort, and very productive on deep rich lands, and will yield a good crop on most soils that are not very poor. Four bushels are usually sown per acre, and the produce is generally somewhat greater than the *Poland*.

The *Tartarian* are a very late sort, but very productive; though extremely light, and consequently not much esteemed. The *Siberian black* oat is a very large, long grain, but liable to drop out in the field: It requires as good land as the white oat; but, from its colour, is not quite so valuable. From the

large size of the grain, it is necessary to sow five or six bushels per acre. It is sown early, and is a very forward sort. The *Small*, or *Devonshire Black* oats, are most commonly sown on chalky downs, and being very hardy, will grow on almost any poor soil; though it is the most productive on good land, and such as is in fine tilth. Four bushels per acre is the common quantity sown on the poor lands of this county; but some farmers, on very bad land frequently sow more; that quantity, however, is quite sufficient if the land be perfectly clean. This sort of oat being hardy, and ripening late, cannot be sown too soon, provided the land be dry and in a proper state. The *Red* oats are but little cultivated; when they are, it is chiefly on the poor cold stiff lands: their straw is said to be particularly valuable for cutting into chaff.

The *Grey* oats are a very long, thin, poor, light grain, and are chiefly cultivated on account of their producing a large quantity of straw, on very poor land, for the purpose of cutting into chaff for horses. They must be sown early.

When oats are about four inches high, it is a custom with some husbandmen to run a wooden roller over them, after a shower of rain has softened the clods, by the breaking of which, in this way, fresh earth is laid to the roots of the plants, and their tillering is considerably increased, if they have not been sown too thick. Both oats and barley should be carefully weeded.

This kind of grain is ripe when the straw turns yellow, the corn becomes hard, and the chaff begins to open and shew the feed. Oats may be housed the wettest of any corn, if the weeds among them be but dead. For in very rainy harvests, when other grain is spoiled, this will receive little or no damage, the surface of its straw and ears being so smooth and compact as to turn off water, and of so dry a nature, that, though housed wet, they will not heat in the mow, or become mouldy, as other grain commonly does.

SECT. XIII. Of Pease.

MANY different sorts are cultivated. The small tender sorts are generally improper for a cold soil; and the large sorts, on account of their great haulm, are not proper for strong rich land, as their haulm will increase to too great a length, and not be able to bear pods. They pod best when sown on a mellow mould, rendered light by ploughing.

The common *white* pea is most suitable for light sandy land, or a rich loose soil. It is generally sown with a broadcast, and only harrowed in. Three bushels of these pease are the common allowance of seed for an acre; and the general time of sowing them is about the latter end of March, or the beginning of April, on warm land; but a fortnight or three weeks later, on cold ground. When sown in drills, which is probably the best way, a bushel and a half of seed is sufficient for an acre. When they are thus set regularly, the ground can be stirred with a hoe, to destroy the weeds, and earth up the plants, by which they are greatly improved, and rendered much easier to cut when ripe.

Green and *maple round* pease require a stronger soil than the *white*, and should be sown a little later in the spring, and considerably thinner, as they are apt to grow rank, especially in wet seasons. When sown in drills at the distance of a foot and a half, the ground between the rows should be stirred two or three times with a hoe, which destroys the weeds, and renders the land fitter for whatever crop is put on it the following season.

For *Grey* and other large pease, the best time of sowing is about the beginning of March, when the weather is pretty dry; for if they are sown in a very wet season, they are apt to rot, especially if the ground be cold. When sown by the drill, the distance between the rows should be about three feet, and the pease be sown thin in the rows: for if too thick, their haulm will spread so as to fill the ground, and ramble over each other; by which means many of the plants are rotted, and hin-

dered from bearing. The common allowance of these large pease is two bushels to an acre: but this is certainly more than is necessary. *Grey* pease thrive best on a strong clayey land.

In different parts of Kent (Mr. Boys observes) the *Reading* and *Leadman's Dwarfs*, the *Grey Poll*, *Nutmeg Grey*, and *Early Dun*, are cultivated for breaking and fattening hogs. They have also many varieties of early and marrowfat pease; and all the different sorts are drilled in rows about a foot and a half apart, from the middle of February to the end of March, or even later. During the summer, the crops are cultivated with horse and hand hoes. The *Leadman's Dwarfs* and the *Early Greys* are thought to be the most productive. The *Early Charleston* and *Hopspur* pease in this county are frequently sown on the land in sufficient time to have a good crop of turnips.

It is evident from all the experiments which have been made in the culture of this kind of grain, that as large pease ripen late, and run much to haulm or stalks, they should be sown as early as the climate will permit; for thereby they will get so forward as to have time to put forth and perfect all their blossoms, &c. before a rainy autumn comes, and hurts their farther vegetation. This sort of pease ought to be sown on a white, or some mixed land, not very full of juice; but by no means on a cold clay: for the moisture of this last will keep feeding the haulm, and thwart the design of sowing them early. The white or mixed mould must be in good condition, otherwise it cannot maintain a great pea. But a small pea, which ripens early, should be sown in a strong feeding land, because such land will nourish it more vigorously, without danger of too great an increase of its haulm, which is naturally short; and notwithstanding the coldness of the soil, there is no fear but that it will ripen. Moderate rains are of great service to pease while they are growing, and particularly at their time of blossoming and filling up their pods; but a continuance of cold rain for some time is perhaps as prejudicial as too much heat or drought. The blueish bloom upon their leaves, and their expanding the two outermost and largest leaves of their blossoms backward, are undoubted signs of great health and vigour.

When the pease are reaped, they are generally laid up in small wads, and left in the field till the haulm and pods are dry: but during this time they should be frequently turned, and raised as much as possible from the earth, that they may lie hollow for the wind to dry them, especially when any rain happens to wet and beat them down. In some counties they set their pease abroad in stacks, being persuaded that they thence acquire a much better colour than when housed in a barn.

SECT. XIV. Of Beans.

THE soils on which beans are most successfully cultivated are of the stiff or strong moist kind. They do not thrive very well on warm dry lands. If the inclosures on which they are sown be open, it is also advantageous. They are frequently sown on land which is fresh broken up, being of considerable use in breaking and pulverising the ground, and also in destroying weeds, so that the land is rendered much better for corn, after a crop of beans, than it would have been before, especially if they are sown and managed according to the new husbandry.

The season for sowing beans is from the middle of February to the end of March, according to the nature of the soil; the strongest wet soil should always be last sown. The usual quantity of beans sown on an acre of land is about three bushels, though this is double the quantity that is necessary when the new husbandry is employed.

The common method of sowing is after the plough, in the bottom of the furrows; but in this case the furrows should not be more than five, or at most more than six inches deep. If the land be newly broken up, it is usual to plough it early in

the autumn, and let it lie in ridges till after Christmas, then to plough it in small furrows, and lay the ground very smooth. These two ploughings will break the ground fine enough for beans; and the third ploughing is for sowing the beans, when the furrows are to be made shallow.

In the common practice many farmers set their beans too close: for as some lay the beans in the furrows after the plough, and others lay them before the plough, and plough them in; by both methods the beans are laid as close as the furrows are made, which is much too near: for when they are generally drawn up to a very great height, they are not so apt to pod as when they have more room, and are of a lower growth. It is a better way, therefore, to make the furrows three feet asunder or more; which will cause them to branch out into many stalks, and bear in greater plenty than when they are closer: by this method less than half the quantity of beans will be sufficient for an acre of land, and, from being more exposed to the air, they will ripen much earlier, and more equally than in the common method.

In planting beans according to the drill husbandry, the ground should be four times ploughed before they are set, in order to break the clods, and reduce it to a proper state. A drill plough is then to be used, to which a hopper is fixed for setting the beans; the drills should be made at three feet asunder, the spring of the hopper being set so as to scatter the beans at three inches distance in them. By this method less than one bushel of seed will plant an acre of land. When the beans are up, if the ground be stirred between the rows with a horse-plough, it will destroy all the young weeds; and when they are advanced about three or four inches high, the ground should be again ploughed between the rows, and the earth laid up to the beans. If a third ploughing about five or six weeks after this be given, the ground will be kept clear from weeds, and the beans will stalk out, and produce a much greater crop than in the common manner.

Various kinds of beans are cultivated in different parts. In Kent the following sorts are chiefly known: The *common ticks*, the large *flat ticks*, or *May-beans*, *small* or *Essex ticks*, and *French ticks*: and of the garden beans, the *Toker*, *Windfor*, *long pod*, *Spanish* or *Lisbon*, and *Mazagan*. They have also a few other varieties, but which are cultivated only in small quantities. The first is however the sort most generally cultivated by the farmers in that county, and is used for fattening hogs, and as food for horses. They are commonly either drilled, dropped by hand, or boxed, in furrows eighteen inches apart, from three and a half to four bushels per acre, in February and March; and in either case they are mostly hand and horse-hoed twice, and sometimes three times, and finally hand-weeded. The *May-beans* are a larger sort of *ticks*, and somewhat earlier ripe: they are sometimes very productive; but, being larger, are in consequence not so heavy, nor so valuable. Sometimes four bushels and sometimes four and a half of this kind of beans are dropped in by hand per acre; but in other respects they are managed in the same way as the *common tick* beans. The *Essex ticks* are a much smaller sort than the *common tick*, and of a rounder shape. They ripen six or eight days later than the first kind, and are not so productive, but more valuable on account of their great weight. The small *French ticks* are a still less sort, being about as big as a moderate sized pea, and nearly circular; this is the latest ripening sort known, and most valuable when dry, on account of their great weight. It is said they will grow on some sorts of poor land, not well adapted for the larger kinds; but they are not very productive. Three bushels per acre of these two small kinds is a sufficient quantity to seed the land when drilled; which is probably the best method of putting them in the ground. The *Toker* is the largest garden-bean, and somewhat of an oval shape. Several of them are

met with of an inch and a half in length. The quantity of seed is commonly about five and a half or six bushels to the acre. The beans are dropped by hand, in rows about twenty inches apart, as soon as the land is sufficiently dry in the spring. They should be kept perfectly free from weeds during the summer, and be pulled up by hand in harvest. The produce is sometimes very abundant. The *Windfor-bean* is rather less than the *Toker*, shorter, and approaches more to a square form. It is managed in the same way as the last kind in every respect, except a little less seed being required.

The *long pod* is only about half as large as the *Toker*, but a more early sort. They are commonly dropped by the hand in rows about a foot and a half apart; and the quantity of seed necessary is about four bushels and a half to the acre.

The *Spanish* or *Lisbon* is a kind of bean which is still smaller, but which ripens about the same time. The *Mazagan* is the smallest of any of the garden beans, but the most early ripe. This sort is frequently drilled in the quantity of four bushels to an acre.

In the vale of Aylesbury it is common to plough two furrows on each outside of the land, without sowing any beans in them; then to drill the three next furrows; then plough two furrows again without drilling beans in them, and so on, sowing three, and leaving two for intervals, till the land is finished. At the time when the beans are about two or three inches high, it is necessary to plough two furrows up each interval, turning the furrows from the beans, so as to make a ridge in the middle of each interval. This is done with a little plough on purpose, which is drawn by one horse. This work should be done after rain. The intervals are now to be harrowed with a triangular harrow, in what is called cross-tining. By this means the land is laid quite smooth, kept clear from weeds, and the beans have a fine loose mould to strike their roots into.

When the beans are ripe they are either reaped with a hook, or mown; and after having lain a few days on the ground, they are turned several times until they are dry enough to stack; but it is a better method to tie them in small bundles, and set them upright.

Beans should lie in the mow to sweat, before they are threshed out; for as the haulm is very large and succulent, it is very apt to give and grow moist; but there is no danger of the beans receiving damage, if they are stacked tolerably dry; because the pods will preserve the beans from injury; and they will be much easier to thresh after they have sweated in the mow than before; and after they have once sweated and are dry again, they never give. The produce by the new husbandry would seem to be much greater than by the old.

Beans form a part of the food of horses, and are chiefly used in mixture with bran or chaff, though by some upon the road with oats. They are however mostly given to coach-horses and such as are constantly in draught. They afford the strongest nourishment of all kinds of grain, and will enable horses to go through a great deal of heavy labour.

SECT. XV. Of Turnips.

THERE are many varieties of the turnip cultivated, as the *round*, *purple*, and *green-topped turnip*, the *yellow turnip*, the *black-rooted turnip*, and the *early Dutch turnip*.

Turnips are most adapted to a light sandy loamy soil that is not very rich, as in a very rich soil they grow rank and are sticky. They will however grow tolerably well on many other kinds of soil.

The general season for sowing of turnips is from the beginning of June to the middle of August, or even later; though it is not advisable to sow them much later; for if the autumn does

not prove very mild, they will not have time to apple before winter, nor will the roots of those which are sown after the middle of July grow very large, unless there be not much frost in the autumn. By those who propagate them in order to supply the markets with their roots, they are sown successively from March to August. There is, however, great hazard of losing those which are sown early in the year, when the season proves dry, by the fly. They should be sown upon an open spot of ground if possible, as they are apt to draw up too much, and be very long topped, without their roots growing to any size, in close situations.

Land for turnips should be ploughed in April, and twy-fallowed in May, that is, once more ploughed and twice well harrowed, to make it very fine: the seed should then be sown rather thin. One pound is the common allowance for an acre. The seed should be harrowed in as soon as it is sown, with a short-tined harrow, and the ground rolled with a wooden roller, in order to break the clods and make the surface even. When the plants have got four or five leaves, they must be hoed in order to destroy the weeds, and cut up the plants where they are too thick, the remaining ones being left about six or eight inches asunder each way. The sooner this is performed, when the plants have four leaves, the better they will thrive. In the second hoeing, which should be performed about a month after the first, they must be cut up, so as that the remaining plants may stand fourteen or sixteen inches distant, especially if they be designed for feeding of cattle. But where they are sown for the use of the kitchen, they need not be left at a greater distance than ten inches or a foot, as large roots are not so much esteemed for the use of the table.

Another method is practised by some farmers in cultivating turnips, which is sowing the seed in rows, with the drill-plough. The rows are sown from three to six feet asunder. In this way much larger crops have been produced than by the broadcast method, though the last is more generally practised, and does very well when the hoeing is well performed.

Turnips, when sown in drills, require to be hoed by hand, to separate and cut out the plants where they are too near together in the rows; and also to cut up the weeds between the plants, where the plough cannot reach them. If this be carefully performed, the ploughing of the intervals will encourage the growth of the roots, by stirring the ground, and render the land much better prepared for the crop of barley, or whatever else is to be sown the following spring. This mode of culture has been supposed by some to be more expensive than that commonly practised; but those who have made trial of both, find the horse-hoeing to be much the cheapest, and by far the best. The most advantageous way of doing this is to plough between every other row, and some time after to plough the alternate intervals; by which method the plants will receive more benefit, from the frequency probably at first only of stirring the ground, than they would do if all the intervals were hoed at one time; and will be in less danger of suffering from the earth being thrown up too high on some rows, while others may be left too bare of earth: but, when the earth has been thrown up on one side of the drill, it may be turned down again soon after the next interval is ploughed. But as the plough cannot be drawn nearer to the drills than two or three inches, the remaining ground should be forked to loosen the parts, and make way for the fibres of the roots to strike out into the intervals: otherwise, if the land be strong, it will become so hard in those places which are not stirred, as to flint the growth of the turnips. This is however the most necessary in stiff strong land. When the ground is stirred in this manner, one ploughing will be sufficient, after the turnips are eaten off, for the sowing of barley or any other crop.

An ingenious farmer (Mr. Wimpey) says it is absolutely ne-

cessary for this crop that the land be very well pulverized. The number of ploughings and harrowings for this purpose must therefore depend upon the nature and condition of the soil. Twice in some land is more effectual than four times in others; but be the labour whatever it may, it must not be omitted. It is also equally necessary that the soil be either naturally rich and good, or made so by a proper quantity of manure. Turnips never arrive to a good and profitable size in poor land, without good manure to promote their growth and push them forward.

It is likewise of great consequence to have seed that is both good in quality and of a good species. He prefers the *large green-topped*, as being the sweetest and most juicy. Some prefer the *red* or *purple-topped*, as being hardier: but whichever sort is sown, the seed from the largest and finest transplanted turnips is greatly to be preferred, even if it cost double or treble the price of the common sort. It may be of advantage also, in this as well as other cases, to change the seed frequently. "As to the quantity of seed (says Mr. Wimpey), supposing it to be good and the season favourable, a few ounces would be sufficient to stock the land; but as the article is so very precarious, it is by far the safest way to allow seed in plenty, and reduce them afterwards by harrowing the ground well. And the greater the success in providing a good plant, the greater is the necessity that the crop be well and carefully hoed: without this, the important advantage to be derived from a good crop of turnips would in a great measure be lost. Twice hoeing, when well performed, is often sufficient for this purpose, especially if the land be pretty clean; but if it be foul, three times is hardly enough."

In the mode of planting, Mr. Wimpey seems to think that the broadcast is the most productive, if the hoeing be properly performed and in good time; but suggests, that the mode of sowing turnips between beans planted in rows, as recommended by some writers, is a much more certain means of insuring a crop.

The sowing of turnips has also been attempted between the drills of wheat with some success.

In Norfolk, turnips are equally cultivated upon heavy and light soils; and with respect to the preparation of the land for them, Mr. Kent observes in his excellent Survey, that the first ploughing should not be later than Christmas, and should be to its full depth, unless the land is foul, in which case it should be ploughed very shallow the first time, in two-furrow ridges, and the second time to the full depth; but it should never be ploughed in wet weather. After the first fallow has received the benefit of the frost and snow, it should be harrowed down in March. The next ploughing should be as soon as the barley sowing is over, and it should have five earths in all: the last ploughing but one, the dung is ploughed in very shallow, and rolled down; and the last should be about a fortnight after, not later, as the muck will about that time begin to ferment. About twelve loads to an acre is a proper dressing. "There is (says he) perhaps no part of husbandry more deserving of imitation by the rest of England than this. Some persons use rape cake for turnip manure; and Mr. Styleman, of Snettisham, a gentleman of considerable fortune, who farms part of his estate upon a large scale, and is trying many ingenious experiments, uses it in a pulverized state, to which he reduces it by means of two mills worked by two women, each mill being formed of two cylinders revolving towards each other. The first breaks the cake into pieces of the size of a walnut, by the operation of cogg'd cylinders: the second is constructed of plain cast-iron cylinders, similar to those used for grinding clay to make bricks. Thus reduced to powder, he puts it into the very drills, where he had just before deposited the turnip-feed, by means of Cook's machine, which requires no other contrivance or alteration than substituting different cups and funnels. The quantity of cake

used is a quarter of a ton per acre, which has never exceeded 1l. 5s. in its price." He assured Mr. Kent, that this method had never failed to insure him a good crop.

We are also told that river weeds and fedge have lately been used to very great effect, for turnips, by Mr. Coke, and Mr. Branthwaite, of Taverham, who assert that no manure whatever answers better. They are strewed on the ground, in their wet state, as soon as they are taken out of the water. If the land be of a dry nature, Mr. Kent thinks there is no fear of any aquatic seeds taking root in it; but if it be of a cold or wet nature, abounding in springs, he advises this manure to be used with great caution. As this writer suspects that land may grow tired of turnips, he recommends to the English farmer to break the succession of the crops now and then by substituting vetches or potatoes instead of them, which may be done without interruption to the succession of his corn crops: in this way, he is of opinion, this valuable root may be permanently established in our system of agriculture.

Hoeing is an essential part of the culture of turnips, and in this county is performed twice with great care and attention.

The method of raising this valuable root in Suffolk is this: In November, they begin to plough in their wheat stubbles, and give the land four ploughings afterwards, at such times as suit their convenience. Previous to the last ploughing, which should be in the latter end of June, they cart on twenty loads, each of which is as much as three horses can draw, of rotten dung, or muck, from the farm-yard, turned up in April, or early in May. Sometimes, as lime is the readiest and cheapest manure in these parts, it is used instead of dung, but the latter is thought preferable. One quart of seed is sufficient for an acre, and new seed is the best. That which is ploughed for the last earth should be sown the same day; otherwise, unless rain falls, the ground will be too dry for the seed to vegetate. When the turnips are within three days of being fit for hoeing, if the weather be dry, they run a pair of light harrows over the field, in a direction contrary to that of sowing, and before they are hoed the first time. The turnips are hoed with a seven-inch hoe, and left twelve or fourteen inches distant from plant to plant. They constantly hoe them twice, and find great advantage from the practice.

In Gloucestershire the oat stubble is ploughed in autumn or the beginning of winter; in which state it lies till spring-feed time is finished; when, being well dragged, it receives two or more ploughings, if necessary, with sufficient dragging and harrowing between, and allowing as much time as possible between each operation, for the seeds of weeds to vegetate and be destroyed. The dung of the farm-yard is then applied, and the turnips are sown from the latter end of May to the beginning of August, and once or twice hoed as circumstances require.

In Kent (Mr. Boys says) the preparation for turnips is to plough the land in the winter, and two or three times more, as opportunities offer, during the summer months; and to manure before the last ploughing with farm-yard dung, mixed with mould collected from hedges and ditches, unless the land was manured for the preceding crop of corn. For if the land be not in good heart, it does not produce good turnips.

The sorts of turnips chiefly cultivated there, are the *red*, *white*, and *green round*, the *tankard* and *tap-rooted* turnips. The first sort is generally preferred. The *tankard* stands high above ground, and is a good sort to feed off before the frost sets in; after that, they are not so useful, being more liable to injury from frost than other sorts. The *red round* is esteemed a very hardy kind.

On poor lands the time of sowing is about the end of May; but the general sowing is about New Midsummer-day: good crops are, however, often obtained by sowing the last week in

July, and sometimes the first week in August: the latest sown are the sweetest, and stand the frost best. This crop is constantly hoed by hand, once or sometimes twice, as is necessary.

In the General View of the Agriculture of the County of Mid-Lothian, it is observed by Mr. Robertson, that though turnips may be forced to grow on heavy or on damp soils, it is found impracticable in that moist climate to take them off such lands in winter; they are therefore cultivated only on dry soils, and generally as a substitute to summer-fallow. The ground receives commonly a furrow previous to the winter, and care is taken that it be well pulverised in the months of May and June, by frequent ploughings before the manure is laid on, which is generally at the last operation immediately before the seed is sown, which is usually in drills, from two feet to thirty inches asunder. In some cases the dung is laid in the drill below the seed; in others, it is spread equally over the whole field; in which case the land is sometimes laid quite flat, without being formed into drills, the seed being sown, however, in rows at the usual distance; a practice which seems to be judicious, from this, that the principal risk attending this crop is from the seed's not vegetating; a circumstance more apt to occur, when sown on the top of a drill exposed to the drought, than on a flat field, where of necessity there must be more moisture. The kinds of turnip are chiefly the *red*, *white*, and *green*, sometimes separately, sometimes mixed. The *red* is said to be the hardiest; but the cattle, at first, have a greater aversion to it, perhaps from being more pungent to the taste. With respect to the quantity of seed, it is from 1½ lb. to 2 lb. per Scotch acre. The time of sowing is from the middle to the end of June; when more early, the turnips are apt to shoot before winter; when later, there is a risk that the seed does not vegetate, and the crop itself is less in bulk. This crop is hand-hoed once or twice, and horse-hoed as long as the rows do not prevent it by growing together, which generally happens by the beginning of September.

In the growth of turnips, there is a certain period, as in other plants, when they are in the greatest perfection, and most nourishing state for cattle: Those who have occasion to purchase them, observe that an acre of turnips before Christmas will fatten as many sheep as an acre and a half of the same turnips after that time.

It is a custom with some farmers to draw up their turnips late in autumn, and lay them up in store against winter; by which means they are always ready. It is however very difficult, if not impracticable, to preserve them from very severe frosts, unless they have been drawn previous to such frosts. This would not answer the farmer's purpose, as the trouble and expence of housing or stacking them would far exceed the advantage, even in a hard season, and in mild winters would be entirely thrown away.

But to preserve them for late spring-feed is not a task of such little difficulty. Divers methods have been tried; and among the rest, that of drawing and burying them in sand: but this has not answered, on account of the juicy quality of the turnip and the hot nature of the sand quickly promoting their vegetation; after the termination of which they speedily putrefy, and become quite unfit for food.

The best mode of preserving them is probably to stack them up in dry straw; a load of which is sufficient to preserve forty tons of turnips. The method is this: After drawing the turnips in February, cut off the tops and tap-roots, and let them lie a few days in the field, as no weather will then hurt them. Then, on a layer of straw next the ground place a layer of turnips two feet thick; and afterwards another layer of straw, and so on alternately, till the heap be brought to a point. Care is to be taken that the edges of the layers of straw be

turned up, to prevent the turnips from rolling out; and the top is to be well covered with long straw, as a thatch. In this way, as the straw imbibes the moisture exhaled from the roots, all vegetation is prevented, and the turnips are nearly as good in May as when first drawn from the field. Old haulm or stubble will answer the purpose where straw is not easy to be had.

However, in order to prevent this trouble and expence, the method used by the Norfolk farmers may perhaps be advantageously followed; which is, to continue sowing turnips to the latter end of August; by which means their late crops remain good in the field till the latter end of April, and often till the middle of May. But in whatever way accomplished, the advantages of having turnips good till the spring-feed is generally ready, are extremely obvious and important.

The principal use of turnips is in feeding cattle in the winter and spring, when there is a want of grass for their pasture. Oxen and hogs are particularly fond of this food, which is very fattening to them; and when given to cows their milk is much increased by it. Sheep also eat it readily, and thrive upon it, when they have been used to it early; but they do not relish it when it has not been offered them till they are grown old: however, if they are kept fasting two or three days, most of them take to it; and when they have once tasted it, they become very fond of, and feed kindly upon it. In some places, farmers feed their lambs with turnips till the middle of April, when they begin to feed. This is done in order that their clover, sainfoin, lucern, &c. need not be hurt. The practice of turning a flock of sheep at random into a large field of turnips, is very improper; for they will spoil more in a fortnight than would keep them the whole winter. The best methods of feeding them with these roots, are the following:

1st. To portion out the turnip ground, by inclosing with hurdles so much only as the sheep can clear in one day; and advance the folds farther into the field every morning, until the whole be consumed. The sheep, however, in this case, never eat them clean; they only take the leaves and the heart of the turnip.

2d. This differs from the former only in pulling up the turnips so far as they are hurdled off, before the sheep are turned in. In this way they eat them better, and there is not such great waste.

3d. This is to pull up the turnips, and carry them into some other ground, and there spread them every day on a new place, where the sheep will eat them up clean. It is particularly necessary where the land is wet.

In Gloucestershire they are sometimes given in quantity to farm-horses: they keep them very healthy, and induce them to eat the barn chaff and other dry meat with a better appetite.

In Norfolk, on the light soils, they feed the turnips off with stock in the field where they grow; but on the heavy wet lands, they draw them and carry them off in light carts, to be eaten either in some grass or unploughed stubble field, or in the houses or yards at home. "In general (says Mr. Kent) they are drawn, and given to neat cattle, either in cribs or stalls, which is productive of a vast quantity of muck; or else they are scattered before them, as well as the fattening sheep, upon a dry piece of pasture or stubble; and of late years it is become common to strew them before cattle upon the young wheat, and upon light land, and there probably can be no better husbandry; by which means they go much farther than they would if trodden into the dirt, and enrich the land very much upon which they are so thrown; it being understood, in Norfolk, that the land wherein they grow is left in sufficient heart by the manure bestowed upon it for the tur-

nips: so that it is apparent, that by manuring one piece of land they manure two. Indeed, where the land is poor, they draw every other ridge, and feed the other off with sheep, as in other counties; but this is not by any means the general practice."

But Sir Thomas Beavor observes, that the best farmers near Norwich, especially where the lands are rich and moist, feed their bullocks chiefly in yards, which have sheds erected in them, under which bins and racks are placed, whereby the cattle, kept dry and warm, thrive faster with less food, and with less waste of hay and fodder. In this Mr. Kent agrees, and thinks the cheapest and best way of fattening a bullock, is to give him plenty of turnips, in cribs, in an open yard, with plenty of barley or oat straw, in a rack under a shed, where he can take shelter when the weather is bad. A beast, says he, treated in this way, will do as well, having his liberty with plenty of turnips and straw, as he will confined in a stall with turnips and hay. In the Survey of Kent it is remarked that the principal, and by far most profitable application of this crop, is to fold them off with sheep. Some few are drawn and carried away for fattening cattle, either by strewing them on grass-land, or stall-feeding; but this is terribly destructive to the land from whence the crop is taken.

The chief evil to which a crop of turnips is exposed, is that of their being destroyed by the fly, which commonly happens soon after the plants come above-ground, or while they are in the seed-leaf; but after they have put out their rough leaves pretty strong, they are past this danger. This always happens in dry weather; therefore, if there should be rain when the turnips come up, they will grow so fast as to be in a few days out of danger from the fly. Another danger of the crops being destroyed is from the caterpillars, which very often attack them, when they are grown so large as to have six or eight leaves on a plant. The surest method of destroying these insects, is to turn poultry into the field, which should be kept hungry, and turned early in the morning into the field: these fowls will soon devour the insects, and clear the turnips.

Mr. Kent, however, thinks that the only precaution against the fly consists in ploughing the land till it is very fine, and filling it full of muck. Rolling in the night has sometimes been used with success on turnips, when in their first leaf. Another powerful enemy of the turnip is the black canker. "Some people (says Mr. Kent) draw a rope over the ridges, two persons holding the opposite ends: this will brush them off, and sometimes save a few acres; but those who can breed ducks enow, may save a greater proportion, as they devour them very fast. In some places this insect is said to be gathered by the hand."

Ruta-baga, or Swedish turnip. This turnip has been lately introduced into cultivation, and thrives well. The following account of it is given in Mr. Robertson's Survey of Mid-Lothian: "It is (says he), perhaps, not so beneficial in some respects as the common turnip; but as it admits of being transplanted with advantage, it is surely an object of attention to the turnip farmers, as by means of it they can fill up any vacancies in the drills of the common kind, with very little expence, which is hardly practicable by any other means. Even where the turnip fails altogether, as by the fly or slugs, the crop can be more readily renewed from a seed-bed of *ruta-baga*, than from re-sowing the field, which seldom comes to much good."

The subsequent communication, procured by the Hon. Baron Cockburn, sets the *Swedish turnip* in a still more favourable point of view. "This plant (says he) is the best calculated of any for a northern climate; it stands frost well, keeps wonderfully when headed with straw built in flocks, which becomes in a great measure necessary, as hares resort to

it from all quarters, and will touch no other root, while any of it remains. It eats as well after it is shot and sheds its seed, as it does before. I saw (continues he) the remainder of a stack of it, the end of last May, at the Duke of Buccleugh's farm, which, with several others, had been lifted and stacked the first week of November at Dalkeith, after the winterers had been turned to grass; one root of which I carried home, and found it, when boiled, eat as well as it would have done in the month of October."

"Cattle are much fonder of them than turnips, inasmuch that when put into a straw-yard together, the turnips are never touched until the other is entirely eaten up. Nay, after having been accustomed for some time to the Swedish plant, they have been found to refuse turnips for many hours, and, even when compelled by hunger, to take to them with a seeming reluctance: the superior nutritious quality of the plant is pretty well ascertained from this fact; that, upon a comparative trial of a number of square inches of a single root, against the same of field turnip, the weight was a third more; and that cattle fed upon it, put up at the same time with others upon turnips, advanced more in a month than the others did in six weeks. Upon land prepared for turnips, the proper season for sowing it is about the 10th of May, and not much later. It has been tried in February, when early garden turnips are sown; but it always failed, growing to the stalk only without any root: when sown after May, it seldom nipped to any tolerable size. Hares don't much take to it until the end of October, when the frost commonly begins: but as it can then be stacked, this objection is removed; and likewise the trouble attending the supply of cattle during a storm with turnips, which will not suffer to be kept long after being taken out of the ground. The shaws of this plant, when carefully stripped, are found to be an excellent kitchen green, and a good substitute for spinnage."

We have, in addition to this account, the following circumstances communicated by another gentleman:

"For five years (says he) I have found the Swedish turnip very useful, although less productive than the common Norwich kind; half the quantity will go nearly as far, and nothing will destroy it in winter. As a specimen of its hardiness, I shall mention one fact:—Last winter, which was a severe one, my sheep got into a field, where both species were growing. The smallest bite on the common turnip caused them to rot completely; and although many of the Swedish turnips were half devoured, the remaining pieces continued perfectly fresh and sweet, till the sowing of my barley obliged me to carry them off for my sheep."

In the Survey of Lancashire it is also remarked that the *rutabaga*, or *Swedish turnip*, stood the severe frost of 1794 and 1795, whilst the English turnips of almost every species suffered, and upon the wet lands were totally rotted and destroyed. The tops of the Swedish turnip, it is true, shrunk; but the root stood quite firm. They likewise keep much better than the common turnip when taken up in autumn.

SECT. XVI. Of Potatoes.

THE soil in which potatoes thrive the best, is a light sandy loam, neither too dry nor over moist, but brought to a fine tilth, and ploughed very deep: for the deeper the earth is loosened, the finer and larger the roots will grow. Four eyes of the cluster sort of potatoes being planted by Mr. Townley on four different kinds of soil, produced as follows. In

1. A strong rich loam, 34 lb.
2. A light rich loam, 29
3. A good gravel, 19
4. A sandy soil, 15

It seems therefore well ascertained, that dry soils are to be

preferred for potatoes. An old sward or fresh lay is preferred in many places as a preparation for potatoes, and is said frequently to produce large crops without any manure being applied. In Suffolk, an old layer produced 400 bushels without manure: and in Cheshire, old grass dug, 500 bushels per acre. The culture of potatoes is also highly advantageous for improving waste and mossy soils; and large crops are frequently produced on these kinds of land, particularly the latter, when made dry by draining.

In the Report of the Committee of the Board of Agriculture, we have the following comparative experiments on the advantages of different kinds of manures in the culture of potatoes.

EXPERIMENT, NO. 1.

	Manure per Acre	Crop Bushels.
53 Loads (cubical yards) farm-yard dung	-	400
160 Bushels foot	-	360
160 Ditto wood-ashes	-	240
32 Loads of dung	-	280
42 Ditto	-	360
No manure	-	180

EXPERIMENT, NO. 2.

32 Loads dung, and 40 bushels of wood-ashes	400
No manure	280
160 Bushels of slaked lime	380
1½ Ton of barley straw	300
340 Bushels of pot-ash	380
32 Loads of dung	400
32 Ditto, and 160lb. salt added at time of spreading	400
32 Ditto, and 160 bushels lime	480
32 Ditto, and 480 gallons of urine	520

By Mr. Billingsley not less than 20 loads, each 30 bushels, of *well rotted* horse-dung is recommended, and hog-dung he found next to horse-dung in utility.

In comparing different manures, Mr. Young had the following result:

No.		Bush. per acre	Second Year
1.	No manure, produced	120	140
2.	Night soil 10 wag. loads	600	640
3.	Ditto 6 ditto	650	500
4.	Ditto 2 ditto	500	300
5.	Bones 10 ditto	650	640
6.	Ditto 6 ditto	640	560
7.	Ditto 2 ditto	560	240
8.	Hog dung 60 one-horse cart loads	480	300
9.	Ditto 30 ditto	480	160
10.	Yard compost 60 ditto	300	240
11.	Ditto 120 ditto	480	300
12.	Ditto 30 ditto	140	140

In Scotland sea weed has been used with success. It is put into the furrows of the drills. The refuse of peat stacks, and peat ashes have likewise been found an excellent manure for potatoes in the same country.

On comparing different manures, Mr. Townly found that

No.		Produce, lb.
1.	Coal ashes only	211, rather small
2.	Stable dung and coal ashes mixed	344, very fine
3.	Stable dung alone	315, ditto
4.	No manure	134, very small
5.	Compost, dung, lime, and soil	204, middling
6.	Stable dung covered with common yellow moss	438, remarkably fine
7.	Soapers' waste	383, very fine
8.	Stable dung and lime	268, tolerable
9.	Lime alone	187, ditto

	Produce, lb.
10. Coal ashes and lime —	192, ditto
11. Stable dung and soap's waste	298, very good
12. Soot, soil and coal ashes —	271, ditto
13. Salt and soil —	200, ditto
14. Saw dust and coal ashes —	190, smaller
15. Stable dung and saw-dust	307, very fine
16. Dung of poultry and coal ashes	236, pretty fine
17. Dung of poultry and sand	156, rather small
18. Saw-dust and lime —	197, ditto
19. Decayed rushes and lime	203, very good
20. Tanners bark and lime	76, very poor
21. Bark and stable dung —	144, rather larger
22. Bark alone —	35, very poor
23. Stable dung and lime spread over the land —	230, pretty fine
24. Chopped whins, with a cover- ing of lime over them —	256, very fine

In these trials the manure was placed in furrows of 5 feet lands.

Stable Dung, when it is used upon sandy or gravelly soils, should be completely fermented, and, if accurately laid into drills above the potatoes, will produce a good effect. Upon clays, however, or tills, what is called long or rank dung will be much more beneficial; not that its nutritive qualities are greater when it is in that state—on the contrary, they are less—but it has one good effect in clay-soils, viz. that of keeping the ground open, and thereby allowing room for the roots to spread and swell in every direction. This idea is so far improved upon in some situations, that broom and furze, and even wheat-straw, are put into the drills by way of manure; and the use of them is certainly attended with considerable advantage; but their effect is completely misunderstood; for in place of supposing that their greatest benefit depends upon their keeping the soil free and open, which is certainly the fact, it is ridiculously imagined that they act as manure. We by no means dispute that furze or broom, when completely rotted, may be converted into manures; but we are perfectly convinced that their benefit in this case will be more completely experienced upon the crop that follows the potatoes; as by that time they will be decayed, and mixed with the soil.

Moss and Turf. On the same principle that long or rank dung is valuable as a manure for potatoes, moss becomes equally so. Upon light soils it will produce good effects, both by enabling the potatoes to resist the drought, and by affording them an excellent nourishment. Upon strong clays or tills, its effects will be similar to rank dung; namely, that of keeping the soil open, and allowing the roots to spread and swell freely. The use of moss in this case will be an advantage not only to the present, but to the succeeding crops. Upon light thin soils it will be a considerable addition to the staple of the land; and if the substratum be chalk or limestone, so much the better, as it will correct its alkalescent quality, and render it more retentive of moisture; by which means it will bear drought better. Upon clay soils, again, it will break their cohesion, and afford a free passage to the water through them: by this means they will be mellowed down, will be much easier laboured, and will be brought in a great measure into the condition of loam. Turf acts in the same way as moss.

New Earth or Soil. From very great crops of potatoes being raised upon new soils, Mr. Somerville was led to suppose that the use of new earth laid into the drills would act as a manure. He consequently made a trial of it upon a crop of potatoes planted about the end of June, on a spot of ground from which a crop of the early kind had just been separated. One of the drills of this late crop was planted without any of the new earth: the effect was very visible; that where the earth was applied, yielding a luxuriant good crop, nearly double of

what was obtained from the drills, where none of it was used. The soil made use of in this experiment, was the sub-soil of a part of the same garden; which was taken out in the following manner: A trench was dug of eighteen inches deep, and the same width. Into this trench the first spading of the earth was thrown, and the next spade-depth of the sub-soil taken out and carried away. In this way the surface remains unaltered, and the ground is equally valuable as it was before the removal of the earth: besides, this earth can be restored at a future period from the field to which it has been carried, by taking away a part of the sub-soil from it in the same manner. It may be remarked that the practice of taking out the sub-soil may be followed with the same success for any other crop, as well as potatoes.

Lime is frequently employed as a manure for potatoes, and, to appearance, with considerable success, especially upon new lands, or deep heavy loams that have been long under tillage. From some observations which Mr. Somerville has lately made, he is disposed to think lime an improper manure. The circumstances which gave rise to this opinion are as follow: A piece of ground (deep loam) was well manured with lime and planted with potatoes: when their plants appeared above ground, near three-fourths of them were curled, while at the same time a few drills immediately adjoining, which had got no lime upon the soil, and planted with the same seed, were entirely free from the distemper. This circumstance attracted notice; and the same experiment was repeated next year, with the same result. Since that time, the author has paid particular attention to those situations in which the curl is most frequent; and he has uniformly found it to prevail most in the districts where much lime or ash-dung is used. He has also observed, that in those parts where the lime-husbandry is but partially practised, such as the hills and uplands, scarce any such thing as the curl is known. There is one circumstance in these upland situations that may operate as a preventive of this disease; that is, the nature of the soil; which is for the most part mossy. This idea gains considerable strength, from observing the practice of the Lancashire planters; some of whom send their favourite kinds to the mossy grounds to recover, after they have caught the disorder.

But at the same time that we are disposed to think that lime in its simple state has a tendency to produce the curl in potatoes, we entertain a very different opinion of it when made into a compost with earth and dung. If the compost has been well mixed, and the quantity of lime not too great, the active qualities of the lime will be exerted upon the substances with which it is mixed: when employed in this way it will be found a good manure, and, in nine cases out of ten, no curl will appear. It ought therefore to be laid down as a rule, That where lime is used for potatoe-crops, it should always be previously mixed into a compost with earth, dung, or some of the putrescent manures. In this way it will afford a valuable nourishment for the crop, and every inconvenience attending its use will be avoided or guarded against.

Quantity of Manure necessary. The quantity of manure necessary for a potatoe-crop, differs according to the nature of the soil and other circumstances. Where stable-dung is used upon sandy or gravelly soils, and it would seem that it should not be employed upon any other, the quantity is generally about thirty loads per acre: in some cases, however, forty loads are laid on.

Where furze, broom, straw, or brown moss are made use of as manures, it should only be upon stiff clays. Their value upon such lands, as we have already observed, depends more upon their keeping the ground open than upon any enriching quality they possess. Where the clay is stiff, the quantity made use of will require to be very considerable. In general, however, an acre may be done with furze, broom, or brown moss, for about

10s. where these articles can be easily got. Heath may also be successfully employed for the same purpose. But where rank stable-dung or wheat-straw is used, the expence will run from 40s. to 3l. per acre. The use of either wheat-straw or long dung is improper, as clay lands will receive the same, nay, perhaps a greater benefit from furze, broom, heath, peat moss, or fog. When stable-dung is put into the earth in an unfermented state, it does little more than keep the soil open; and though it may decay when so applied, the succeeding crops will be very little benefited thereby. Wheat straw is still worse; as the utmost benefit the soil derives from it is the addition of a small quantity of vegetable earth. Besides, the use of these shrubby plants will have one singular advantage, which can hardly be expected from any other contrivance; that is, the drills will act as a kind of drains for carrying off the water, and by that means render the field drier; which, where potatoe-crops are planted upon clay lands, is a very important consideration.

After this statement of the most advantageous manures for producing large crops of this useful vegetable, the different kinds of it may be considered. Those that are principally cultivated in Lancashire, according to Mr. Kirkpatrick, are,

EARLY KINDS.

Smooth Yellows.
Red Champions.
White ditto.
Lady Queens.
Drunken Landlord.
Birchal Golden Yellows.
Smith's Seedlings.
Tox's ditto.

Boskow's Kidneys.
English Champions.
Briton's Dwarfs.
Bates's ditto.
Mather's Seedlings.
Kirkham Marbles.
Donbodin's Seedlings.
Poor Man's Profit.
Golden Galleons.
Invincible.

Broughton's Dwarfs.
Hatley's Nonfuch.
Early Perrins.
Dwarfs for forcing.
Early Manleys.

LATE KINDS.

America White Rangers.
Ditto Red ditto.
Derbyshire Reds.
Late Champions.

Ditto Kidneys.
Pink Eyes.
Pink-nosed Kidneys.
Ox Noble.
Lords.
Seedling Potatoes, containing a variety of kinds.
Balmer's Seedlings.
Budworth's Dusters.
Irish Apples.
Winter Kidneys.

The *Ox Noble* and *Cluster* are the sorts chiefly planted for cattle.

The *Old Winter Red* is peculiarly good in the spring, when others have lost their flavour, and has never been known to curl as many others do. In some parts of Yorkshire, the *Ox Noble*, *Champion*, and *Surinam* are cultivated; but chiefly the *Kidney*. And the sorts most in use in the Isle of Man are, the *Kidney*, which are tolerably good, but not prolific, nor do they keep well; the *White* and *Apple* sorts are better than most others for the first part of the season; the *Pink Eyes* and *Copperplates* are hardy, strong, and admit of coarse management; the *Blacks* a late sort, also keep well till August, or thereabouts.

On comparing the *Cluster*, *Red-nosed Kidney*, and *Golden Tags*, Mr. Young found the produce per acre, under the same management in the drill method, to be as follows:

Cluster	360 bushels
Kidney	144
Tags	207

In different garden grounds, Sir Thomas Beevor found the following sorts to produce in this manner:

	Wt. of Seed.		Quantity of Land	Wt. of Prod.		Bushels
	lb.	oz.	planted.	lb.	oz.	pr. acre.
Incomparable, a seedling —	4	9	6 tenths of a rod	13	0	692
Dennes Hill, ditto —	3	1	8 ditto	16	10	668
Bayley's ditto —	3	1	5 ditto	8	6	539
Manley White —	4	12	3 ditto	6	4	670
Kentish Seedling —	2	10	4 ditto	16	11	1342
Champion —	3	6	5 ditto	11	1	708
Ox Noble —	3	11	4 ditto	14	0	1140

In Ireland, Mr. Baker compared various sorts, and found that

	lb.	oz.
Commonwise produced	21	6
Apple	20	2
Red French	15	12
Munster White	16	0
Crones	16	6
Spanish	15	10

And in repeating the experiment the year following, he found the result to be:

Sort.	Barrels per Acre.
Black	111
Quakerwise	108
Red French	88
White ditto	85
Commonwise	103
Apple	76
English White	83
White Munster	79
Spanish	70
Crones	60

Mr. Hassal observes, that the kinds of potatoe, which he has found most useful for family consumption, are the *Apple* and

the *White Kidney*, which are cultivated with great success in the counties of Wexford and Wicklow, in Ireland. These sorts produce great returns, are firm and mealy, pleasant to the palate, and do not acquire that disagreeable taste at the approach of summer, to which many other sorts are subject; and the *Royal*, or *Cum erland Early*, is of a large size, very prolific, of an excellent flavour, and ripens early enough to admit of the ground being employed either in raising another crop of the same potatoes, or a crop of white pease, turnips, cabbages, &c. These circumstances render it very valuable; but what gives it a decided preference is, that it is ready at a time when the price of grain and other necessaries is at the highest, which is between the old and the new crops.

It is generally recommended, that in the spring, just before the last ploughing, a good quantity of rotten dung should be spread on the ground intended for potatoes, and that this should be ploughed in early in March, if the season be mild: otherwise it had better be deferred until the middle or latter end of that month; for, if a hard frost should come on soon after the roots are planted, they may be greatly injured, if not destroyed, thereby; but if they can be planted in the spring, without that danger, it is so much the better. The last ploughing should lay the ground even, and then furrows should be drawn three feet asunder, and seven or eight inches deep. The roots should

be laid at the bottom of these furrows, about a foot asunder, and then be covered in with earth.

The rows of potatoes are placed at three feet distance, in order to introduce the hoe-plough between them, as it greatly improves their roots: for by twice stirring and breaking of the ground between these plants, not only weeds will be destroyed, but the soil will be so loosened, that every shower of rain will penetrate to the roots, and quicken their growth. These operations should be performed early in the season, before the stems or branches of the plants begin to fall and spread upon the ground; as it cannot be done afterwards without hurting the shoots. But as the horse-hoe can only go between the rows, it will be necessary to make use of a hand-hoe to stir the ground, and destroy the weeds in the rows, between the plants. If this is well done in dry weather, immediately after each of the two horse-hoeings, it will be sufficient to keep the ground clean until the potatoes are fit to be taken up; which will be soon after the first frost in the autumn has killed the haulm.

It is the method in some places to lay the dung only at the bottom of the furrows in which the roots are planted.

Mr. Kirkpatrick, in his excellent Treatise on the Mode of cultivating Potatoes in Lancashire, observes, that in order to procure a plentiful crop of any thing raised from the earth by human labour and skill, a proper cultivation of the land is previously necessary, and that each different sort of production of this kind requires, in some particulars, a cultivation or management of the land in some manner peculiar to itself. "The land (says he) may be prepared for a crop of potatoes either by the plough or the spade; but the best method of preparing it for every person who keeps a team of horses is certainly ploughing. It is hereby brought into order at much less expense, a third quantity of the dung will be sufficient which digging will require, as profitable a crop will be gathered, and it will be in equally good order for a succeeding crop. The process of this kind of tillage is as follows: The land must be prepared by ploughing and harrowing exactly in the same manner as for barley. This direction will be amply sufficient for all the counties of England. When it is in this state, and harrowed fine and level on the surface, equidistant drills must be opened the length of the field. The plough, after making a furrow up the field, must be drawn down again close by the same, throwing the soil equal heights on each side. These drills are to be made as wide and deep as will make them capable of containing the dung which is to be laid in the bottom of each. For the distance of the drills this plain and easy direction may be observed: Let it be such, that when your horses stand in one drill, each wheel of your cart or tumbrel may be in the middle of the next drills on each side. When you have proceeded thus far, the next operation is to carry in your manure; and as your horses should stand in one drill, and each wheel of your cart be in a similar situation, the neatness and order of your land will be very little injured. The dung is to be thrown out of your cart in small heaps, sufficient to supply the three drills which your horses and the wheels of your cart occupy, a moderate scattering of which is to be put into the bottom of each drill. This will be completed in a very short time by persons with forks of two tines. These will be the most proper tools for this business, if you make use of long strawy dung lately thrown out of the stables or cow-houses, or collected from the farm-yard not having lain a sufficient time to rot. When the drills are thus prepared, the sets are to be put into them upon the dung about six inches distant from each other. The plough is then to be run on both sides of each drill to throw the earth which was raised out of it upon the potatoes. This operation will elevate it in the middle, and cause it to lie sloping on each side like the roof of a house. The business is now completed until the potatoes begin to make their appearance above ground.

The plough is then to be drawn up and down on each side of the potatoes, which will earth them up and destroy the seedling weeds. This should be performed as soon as any of the plants appear; for if you wait until the whole row are above ground, probably those that rose first may be advanced a considerable height, and they will then be in danger of being broken or injured by the mould, or what they may be covered with.

"There is another method of raising potatoes after the plough, which is covering the ground with dung, ploughing it in, making the lands or beds about seven feet broad, then setting the potatoes with a setting-flick, but not quite close to the edge, that a part may be pared off with the spade to throw upon and cover the plants when they are just making their appearance.

"This may also be managed in a different way. Plough the ground in lands of about seven feet broad, then cover the surface with dung, place your sets upon the dung, and then cover them with the soil cut off the sides, which are left unset for this purpose. This will make the space betwixt each bed very broad, or very deep, or both, as it will take a considerable quantity of earth to cover your sets, and a sufficiency must be left for a second covering, which will be requisite when the plants come up.

"Such are the different methods practised for raising a crop of potatoes by the plough, which is certainly the cheapest and best method for persons keeping a team. But drilling he says is to be preferred, as it will produce a larger quantity of potatoes, and, what is very material, takes a much less quantity of manure. With regard to the kind of manures, strawy unrotten dung is recommended as fittest to be used in the drills, and for these reasons, that it is of the least value of any the farmer has upon his premises, will be more expeditiously placed in the drills, and is full as proper, or more so than any other kind. But any sort of manure will give a crop of potatoes. In the vicinity of large towns the scrapings of the streets, or coal-ashes, used either separately or mixed together, will answer very well. Though lime is not supposed to tend much to the increase of this root, yet if it is mixed with either or both of the above-mentioned articles, it will give strength to the ground, increase the succeeding crop, and improve the flavour of the potatoe.

"When *Push-ploughing*, or paring and burning, though now almost laid aside, was in use, many acres of potatoes were raised from no other manure than the ashes accumulated from the burnt sods and lime. The quantity of lime used for this purpose was about one bushel and a half to each rod or perch of land containing eight square yards. And upon the moss lands, where this process is still practised, potatoes are frequently raised from the ashes of the burnt sod only.

"In raising potatoes by the spade, the land must be divided into beds of seven feet broad, cut out or pierced two or three inches deep with the spade by a line; the ground will then part on each side where it has been pierced, and an equal breadth will be preserved the whole length. The dimensions of the bed are fixed at seven feet, as this is thought to be the most convenient breadth for covering, or throwing the soil on the plants when they begin to appear; but if it be a moist field it will be better to make them only six feet, and in dry ground they may be made a foot wider. In beginning to dig the bed thus marked out, some earth is first to be thrown out a spade's depth, and about a foot and a half in length. This trench is to be covered level on the bottom with soil dug the same depth from the next solid ground farther on the bed. The dung is then to be spread thinly on this covering; you are then to dig again an equal depth, throwing each spadeful of soil upon the manure. This will form to you a second trench, which is to be filled up in the same manner as the preceding one; and thus you are to go on to the end. And if it be green sward, you are to be careful to throw each spadeful with the grassy end

downward, and on the side of the beds place the green end towards the middle. If you do not proceed in this manner, the turf will be an impediment to you when you pare the edges to cover, and also occasion weeds in those parts. It is necessary to be attentive in throwing each spadeful of soil to break the joints as the workmen here call it, *i. e.* to lay your soil as hollow as you can, so that the middle of your last sod may cover the joining of two, and not lie one exactly upon another of equal dimensions, which, it is evident, will make the ground much harder and more compact than the method here recommended. As you draw near the end of this bed, you must lay each spadeful flatter; which, though it will occasion your bed to be some little lower at the finishing than at the beginning, is in some degree necessary gradually to lessen the size of your trench. The soil you threw out at the beginning may be put into some of the following trenches; or, if it is carted to the end, you may readily dispose of it in finishing the work.

"Potatoes are also sometimes set in this county upon green sward. The beds are marked out in the manner just described, with this difference, that a space is left betwixt each, containing soil sufficient to cover half a bed on each side. The dung is then laid a proper thickness upon the solid ground, and the sets are placed at proper distances upon it; after which they are covered with the intermediate soil left for that purpose. But this method is not now much practised."

Mr. Somerville, however, observes, that when they are planted on lays or lands that have been some time in grass, the proper management seems to be that of ploughing the land with a plough which only takes off the sod, and lays it flat down into the furrow with the roots uppermost.

The planter is to follow this plough, and place the sets upon the inverted sod; after which a common plough must follow, and cover them with the loose soil. The sod or sward being thus completely inverted soon begins to rot, and, as it progressively decays, furnishes a manure for the crop. If it be preferred to plant the sets with a dibble, it can be done with great facility, the top of the furrow being a sufficient direction for the planter to keep in a straight line, and the compactness of the sod below will prevent him from going too deep. By the time that this crop is ready the turf is chiefly consumed, and by mixing with the soil will afford a manure for a second. It will in this case, however, be of great advantage to have the ridges so measured, as that the second crop may be planted on that part which formed the interspace between the drills of the first, as by attending to this circumstance the sets will not only be put into that part of the soil which has been completely cleaned and is in no degree exhausted, but an opportunity will be afforded of extirpating the weeds upon that space on which the former crop grew.

For planting early potatoes, the best method, according to Mr. Kirkpatrick, is to set them upon ground that has been well manured the preceding year without additional dung of any kind. The part of your garden or field appropriated to this purpose should be carefully dug, and the clods of earth, if there be any, broken fine with the spade. Drills should then be made with a hoe or spade about a foot distant from each other: in these the potatoes are to be placed six inches asunder, and covered with earth about four inches thick. Mr. Kirkpatrick generally makes these drills with a spade, and the soil which comes out of one, covers the potatoes which have been placed in the former one.

He recommends it to persons never to cut the potatoes which they set very early in the spring. They are of a very tender nature, being almost as soon injured by frost as cucumber plants. If only one eye is left in a set, and the shoot which it has made above ground be injured by the frost and caused to decay, though it may apparently revive from the lowest extre-

mity, very little produce can be expected. If the potatoe be set early in February, which is the time he generally sets his earliest crop, at this season it is not improbable but that the frost may be so severe as to reach even the potatoe itself before it rises above ground: should this happen, if it be set whole, part will be left still uninjured, from which as strong shoots will proceed as if the potatoe had received no injury; but if only one eye had been left it would have been entirely destroyed, and no increase from it would have been produced. It is a custom with some persons to lay their earliest potatoes upon a room floor or in some building, and cover them with saw-dust, the husks of oats, or some species of chaff. In this situation they will make long shoots; and as putting them into the ground is deferred until the weather begins to be mild, and severe frosts are not expected, they may be cut with more safety. Mr. Kirkpatrick, however, advises every one who practises this mode to spread them very thin, otherwise the sprits will be very apt to entwine, and break off when they are removed. In taking them to plant they must be handled very cautiously, and it is much safer to place them in drills than to put them in the ground with a setting-stick. If they are brought forward in this manner under cover, and carefully set when the weather begins to be mild, very early potatoes may be produced. They will make their appearance in a few days after they are planted, and their progress in vegetation will be very rapid, provided they have a dry and warm situation, which always should be allotted to this early production of the garden.

"Potatoes are dug out of the earth by a fork with three tines; and in gathering them the largest are selected for family use, the next size are reserved for seed, and the least of all are preserved for the food of cattle, fowls, or pigs. Two wickets are placed upon the bed: into one the larger ones are thrown as they are picked out of the ground; into the other those reserved for planting; and the smallest are cast upon the ground in heaps, and picked up and carted away at the most convenient time. If the potatoe field be large, and many persons are employed, a cart is placed in it; into which the wickets containing the larger potatoes when full are emptied, and sacks are brought to receive the sets that they may be carried off the ground without mixing with the large ones. They are then generally laid upon a barn floor to dry, before they are deposited for winter purposes. Potatoes of a moderate size are generally chosen for planting, and a bushel of these will produce more sets than two of the largest sort. Every person knows that it is requisite there should be an eye in each cutting: if it has more it is not detrimental, but if it have none it will never shoot. Endeavour to make the cuttings nearly of an equal size, and not some very small and others very large: if this is disregarded, and a setting-stick be made use of, the large ones will not reach the bottom of the hole, and will not receive that advantage from the manure which they would have done if in contact with it. When large potatoes are chosen for setting, which some prefer, the eyes must be cut out about an inch deep, making the part taken out about as large as a walnut. It is common to cut the smaller ones into two, and some that are larger into three parts. It is evident, that the eyes near the root or tail of the potatoe put out weaker sprits than those upon the opposite end or crown; and most people throw away these weaker ones, supposing them not so prolific, or capable of producing such strong plants, as sets from the other parts of this root.

"We have a method of raising potatoes for planting which is very easy, and attended with small expence and trouble, though but rarely practised, which is from the apple or crab, as it is here denominated, which grows upon the haulm of the potatoe, and is full of small seeds. Every species of this root indeed does not bear seed; it is produced by none of the earliest kinds, nor by the Ox Noble and many others of a later sort.

But it is to be gathered from so many, that there is no difficulty in procuring as large a quantity of it as you please. If late in the spring you carefully look over the beds where the seed-bearing potatoe grew the former year, you will find abundance of young plants growing in small clusters, which have arisen from the crabs dropt from the last year's crop. These are to be taken up, and, after being carefully separated, planted in rows at the same distance you set potatoes, in a piece of ground prepared by digging and manure for their reception. These plants will produce abundance of potatoes, some equal to a pigeon's egg in size, but the greatest part not bigger than a hazle nut. But the smallest of these, if set the next year, will produce potatoes of the greatest magnitude, and will upon an average yield a more abundant crop than can be attained from any particular species of this root. It is by this method that so great a variety of this root has been produced; and this is probably the only purpose for which trials of this kind have been made. But this mode of propagation is well worth the attention of every person who raises a considerable quantity of this root. Two pounds of these potatoes will set nearly as much ground as a bushel of large potatoes when cut, and two rods of land large measure will furnish sets more than sufficient to plant a statute acre. But though the collecting seedling potatoes from the beds on which the seed-bearing potatoe grew the preceding year has been mentioned, it will be better to gather the crabs and preserve them until next spring for sowing." Mr. Kirkpatrick has not been able to draw plants from the old ground until the middle or latter end of June, and they are then very weak, occasioned by their growing so close together in bunches. If the gathered crabs were to be crushed and mixed with dry sand, and sown in the beginning of February upon a plot of ground properly prepared, they would probably be much earlier fit to transplant, some of them might be taken up for this purpose, and the rest remain in the seed-bed; by which means they would arrive to greater strength and produce larger roots. February has been mentioned as the proper time of planting the first or earliest crop of potatoes, and about the middle of that month is probably the best, without the weather should particularly invite to plant a few days earlier, or should be so unfavourable as to make it prudent to delay this business for an equal space of time after that time. The latter end of April is the properest time to set the later kinds of potatoes: if they are set sooner in the open field they will be in danger of being injured by frosty air, and the best kinds of potatoes planted then, will have sufficient time to attain to full maturity. The potatoe seed-time in Lancashire continues from April to the latter end of June; but those that are planted so late in the year have not sufficient time to grow to perfection, except they be only intended for pigs, cattle, or fowls.

For raising two good crops of potatoes in one year, Mr. Somerville observes, that the method which has from experience been found most successful is, to plant the ground in the spring with the best early potatoe, in the Lancashire method, which will be ready in the beginning of summer: the soil should then be ploughed once, and planted either with the large white kidney or Killimanca, the sets of which should be cut at least six weeks or two months before they are planted: they should be kept in a place where both air and light may have free access to them, by which means their shoots will be strong and vigorous; and as they will then have no frosts to encounter, they will grow immediately when they are put into the earth. The operation of planting should be performed with the greatest care, in order to preserve the shoots from being broken, as in that case the crop will be rendered considerably later. Perhaps, says he, there is no way of doing this so completely as with a stick: in this way the plant is not only placed at a proper depth, but the shoot is preserved and set upright in such a way,

that the top is equal with the surface. It will certainly be objected to this mode of planting, that it requires more labour than the ordinary method of dropping the sets into the furrow; but, when properly considered, this objection will vanish, as three people with dibbles will plant as many in one day as two persons could do in the ordinary way.

If this comparison as to the difference of expence be just, and it will probably be found very near the truth, it will appear that dibbling requires only a third more labour than dropping the sets into the furrow: to balance which the young tender shoots are preserved, none of the plants are liable to be bruised by the horses' feet, and the work is regularly and accurately performed.

The reason for preferring the kidney or Killimanca for the second crop is obvious: both of these are more productive than any of the early potatoes; and as the price at an advanced period of the season is always considerably lower, any potatoe that will produce a greater bulk will be more profitable. There is, besides, another reason of considerable weight; it is found from experience, that when successive crops of potatoes are taken from the same land, the second and succeeding crops are always more abundant when a different kind of potatoe is planted. This circumstance, he thinks, is well worth the attention of farmers, as by a due observance of it they may plant potatoes for years upon the same soil, with profit to themselves and without injury to the property. A crop of this kind of potatoes will be ready to take up about the beginning or middle of October: indeed if the real kidney is planted, they will be ready in September, when sufficient time will remain either for a crop of greens, coleworts, or a broad-cast crop of turnips, to be eaten off in the spring with sheep. These are not matters of conjecture; the author had last year two very abundant crops of potatoes from a patch of ground in his garden, which was afterwards planted with coleworts, which were very large, before the winter set in. No manure was made use of for the first crop of potatoes, and only a small quantity of new earth, part of the sub-soil of the same garden, was given to the second. It is worthy of remark, that the second crop was not planted till the end of June; and though the season was exceedingly dry throughout, the crop was very productive.

This plan of raising two crops in a year upon the same land applies strictly to light free soils, such as sandy or gravelly lands, and the different kinds of loam. These soils, from their want of capacity for retaining moisture, will always be sufficiently dry to allow the first crop to be put in early enough; but upon wet mossy lands or stiff clays this cannot so readily be done, especially the latter, which, if the winter has been wet, is a considerable time before it can be laboured. There is still another circumstance against potatoes planted upon clays; which is, that they are for the most part watery, and very inferior in flavour to those that are produced upon dry free soils. The only kinds upon which clay makes no difference, are the *Yam* and the different kinds of red potatoe. The taste and other qualities of these are nearly the same upon all soils; but what gives them a decided preference for clay-lands, is the circumstance of their growing to a larger size, and being more prolific than upon any other soil: to add to this advantage, they do not require to be planted very early; time is therefore allowed for working and reducing the land in a proper manner.

In Cheshire, the lazy bed method is much practised, the land being ploughed before Christmas, and in April ploughed across and harrowed; then ploughed deeply into beds five feet wide: at the end of April, or beginning of May, the sets are dibbled in eight or ten inches asunder. In three weeks, or as soon as the buds appear, trenches are dug between the beds, and the plants covered with two inches of soil, spread equally;

hoed, and weeded. And on coarse soils, in the Isle of Man, this method is adhered to: the butts, or beds, are from six to ten feet wide; the trenches from two to three feet; the manure is spread on the surface of the beds; the cuttings placed at ten inches asunder, on the dung, and covered with the earth out of the trenches; when the plants appear, a second covering of finer mould is given them; the two, four inches deep; they must be hoed and weeded.

In Wiltshire, it is common to strew the dung in the furrow, and cover it with the plough; then dibble in the sets at six inches asunder triangularly, the rows being four feet apart; then plough between them, from and to. But in Cumberland they plough the land till sufficiently fine, then strike furrows thirty inches distant, and place the sets at the bottom of the furrows, the dung being laid on them and covered with the plough. And in the county of Durham, they are planted in drills from two to three feet asunder, and one foot from plant to plant.

In Kent, Mr. Dann's method is this: To plough the ground in the autumn or winter: as soon as barley-sowing is finished, carry out the dung (twenty large cart-loads per acre) which if rather long he prefers, spreads and ploughs it in immediately with two ploughs following each other, the horses (three in each) single, and on the land, left by walking in the furrow they might destroy or injure the sets; women and children sufficient following to drop the sets; which, as each furrow is ploughed ten inches wide, will be twenty inches, and the sets in the furrow nine or ten inches apart; nine persons are in general sufficient, and, on the average, two and a half acres per day are planted. The expence for spreading dung, ploughing, and planting, is about 14s. per acre; a slight harrowing, and rolling with a light roller, if necessary, is all that is done until the plants make their appearance.

Where the drill method is followed, Mr. Hassal recommends the setting the drills four feet apart, instead of three, as some advise. He has always found the former considerably more productive than the latter.

A correspondent of the Board of Agriculture observes: "In June last, as I was looking at a crop of potatoes of about three quarters of an acre, planted by Mr. Watts, a gardener, near Leicester, I observed an eighth part of the crop to be at least six inches higher than the other part of the field. This naturally led me to enquire the reason of it, by seeing so great a difference. He answered me, that the ground was all of it digged and manured alike, exactly of equal quality all over; that the potatoes were of the same sort, and that most of them were planted the same day, with only this small difference, that on the part which was the most vigorous, drills were made by a hand-hoe, about a foot asunder; the others, by mere accident, were set by a dibble, or setting-stick, at the same distance. I frequently, says he, visited the crop whilst growing, and observed the superiority increasing all the summer, till the drilled crop was fit to take up, when the stems were about a foot higher, and forwarder by nearly a month, as some of the other were taken up the same day to see the difference. During the summer, they were equally hoed alike three times; and on taking up the whole field, and comparing them together, the produce was about one quarter more from the drilled crop than the dibbled or set one. The potatoes were larger, and nearly a month earlier; which is another great advantage, by having the ground at liberty sooner for another crop. The difference, in his opinion, arises from this cause: In drawing a drill with a hoe, the earth is left in a fine pulverized state, and the potatoe set is afterwards covered with similar earth; the roots consequently have very fine earth to strike into. On the contrary, the hole made with a dibbler, or setting-stick, which in general is shod with iron, hardens and glazes the earth

around it, leaves a hole at the bottom, and the earth is hardened on the sides where the roots are to strike into; and if much rain ensues soon afterwards, the hole may probably be filled with water."

In some parts of Essex and other counties, they plough in the manure, and dibble in the seed upon every furrow, ten inches apart and four deep, by which means they produce pretty good crops.

In the Survey of Mid-Lothian, it is observed by Mr. Robertson, that for potatoes the ground is previously well pulverized by frequent tillage; and it is always the driest soil that is chosen, without regard to the preceding crop. The mode of culture is uniformly in drills, from 18 inches to 4 feet distant from one another, and from 9 inches to 12, plant from plant, in the row. The dung is, in some cases, spread over the whole field; in others, it is confined to the rows; and sometimes is applied to the preceding crop, which is thought to make the best eating potatoes, although rather less in quantity. The seed is sometimes raised from the apple, which requires two years to accomplish; the first producing them only as large as nuts: but they are found more prolific, and generally of many kinds from the same apple. The *kidney* potatoe is esteemed the best; but requires the richest soil; and in that case is more prolific than any other, whereas on poor land it will hardly grow at all. The time of planting potatoes is generally in April, but sometimes as late as the 1st of June. There are some early kinds that are ready for the market by the end of July; but it is commonly October before the later sorts are taken up and housed. It is remarked, in general, that the earliest planted make the best or most *mealy* potatoes; but they are more liable to be curled, and always less prolific. Those planted late are *watery*; but the crop is more abundant, and the curl seldom takes place.

The Curl. This (says Mr. Kirkpatrick) is a disease which sometimes appears on the leaves of the potatoe, and is a certain indication that very little produce can be expected from the plants which are infected with it; it has greatly engaged the attention of the cultivators of this root, and many different reasons have been assigned for this unfavourable appearance. But whatever may be the cause of this malady, a pretty certain method of preventing it has been found out. This is, never to set from the same potatoes two successive years; that is, annually change your seed. Procure for seed, potatoes grown at some distance from you, and upon a soil dissimilar to your own: that is, if your soil be stiff and strong, endeavour to procure seed which has grown on light sandy ground, and *vice versa*. Seed procured from moss ground is seldom or ever subject to curl; and procuring sets from a distance, or from soil of as different a nature as possible from that which you allot for this purpose, is the only method known of preventing this disorder. A change of ground as well as seed has been recommended as favourable to the increase of this vegetable; and every person acquainted with land must acknowledge the superior excellence of fresh land as favourable for all kinds of produce.

Mr. Chapple's mode of potatoe management, for the prevention of the curl, is as follows: If dry weather (says he), in March it is proper to begin to till the early crops, known here (Bodmin) by the name of the *red-nose kidney*. The fairest and best-shaped potatoes are carefully picked out from the others, and cut in small pieces about the size of half a walnut; some contain one eye, others two. The ground being in good tilth by often ploughing, is dressed according to the strength of the grounds, from 20 to 60 loads per acre, of a compost of scrapings of the road, head-ridges, and farm-yard dung: when the plants are about four or six inches high, they are hand-hoed; and if any curled ones appear, they are carefully rooted;

out, together with the sets that bare them: when about a foot high, they are again weeded, and the curled plants, if any remain, are carefully rooted out. It is also necessary to look them over just as they are coming into blossom, and root them out if any curled appear.

Mr. Chapple has for twelve years past tilled from six to ten acres for the market yearly. Those intended as seed for his general market crops the ensuing year, are tilled at a distance from any other potatoe crop, and managed as above-mentioned. Since he has practised this mode, which is about seven years, the curled disease has not injured his crops; and his potatoes have been better than those of his neighbours.

The late crops are the *Irish red*, or *painted Lord*, tilled in April: they produce very plentiful crops, and continue very good from the beginning of December till the kidneys are fit to draw, which is about the first or second week in June. Mr. Chapple has tilled different ways, some by drilling about two feet apart, and twice or thrice earthed up with the double-mould plough; some in ridges five feet wide, leaving between each ridge about 18 inches of ground not tilled, which is thrown between the plants after hoeing: others he has tilled throughout the field, about ten inches asunder between each plant. Many of this last tillage get green and not fit for use. The two former modes answer best with him; if the crops are kept clean about 100 sacks in the average, and in some ground 140 sacks per acre, are produced.

Preserving Potatoes. The method of preserving potatoes not intended for present use, during the winter, as described by Mr. Kirkpatrick, is this: Having lain after they are gathered upon a barn floor, or under cover, a sufficient time to dry on the surface, they are to be deposited in the earth to secure them from rain or frost; to either of which if they are much exposed, they will soon rot and become unfit for any purpose. In order to make these storehouses of safety, a hole is to be dug in the earth; whose whole extent is to be an equal depth, and the dimensions of which are to be regulated by the quantity of potatoes you have to deposit. The store is to be laid in this hole prepared for its reception; and when the first made hollow of this receptacle is filled to the brim, sods are to be dug from the sides of it, and placed firm in their situation round the edge of the hole: this will form a second cavity to be filled; and as you thus advance in height above the level of the surface of the ground, straw is to be placed on the sides betwixt the earth and the potatoes: thus you are to proceed, gradually diminishing the circumference of your heap, until it ends in a point, in form resembling a rick of corn. The earth which covers this must be a considerable thickness, and is to be beat firmly together with the spade, so that no crevices may be left through which rain, snow or frost can penetrate. On the summit of this heap it is common to place one large green sod. As it will take a considerable quantity of earth to cover this deposit, so as to secure its contents from long and intense frost, the surrounding surface of the ground being dug up for this use, it will be lower than the bottom of the hole, which will prevent water from settling in that part; which if it was to remain stagnant there might run in among and injure the potatoes. If, during the winter, frost of unusual severity and continuance should happen, it will be proper to cover your potatoe-hole with some strawy dung, in order more effectually to secure its contents.

In Sussex, the mode of keeping them which has been adopted by General Murray, is to dig holes in the side of a hill, six yards wide, ten feet deep, and of an indeterminate length, into which carts from the field unload at top, and the potatoes are taken out at that end at bottom, which opens to the slope of the hill, where a wall is built with a door. When full, a stack of stubble or straw is built over the hole, wide

and large enough for security against all frosts. In this manner, the effluvia of the roots rising through the stubble does not occasion their rotting from heat. But Mr. Billingsley's method is to dig a trench eight inches deep and four feet broad; a thin layer of straw being put at bottom and sides: he then piles the potatoes in a roof form, four feet high; covers them with straw six or eight inches thick; then earth a foot thick, and thatches over all. By this means they are kept well in the severest frosts. But in the midland counties they preserve them in ridges, and find that there should not be more than four feet wide of potatoes. If some coal-ashes be sifted over the mould, in finishing, they preserve them the better from the frost.

Of all the methods of preparing this root for food, boiling is the most common; and though all instructions on this head may by many persons be deemed superfluous, the appearance and flavour of the potatoe very much depend upon skill and care in this part of cookery. On this head the following directions are given by Mr. Kirkpatrick: Never pare the potatoe like an apple, but scrape off the outer skin with a knife—do not let them boil hastily, nay hardly boil at all, but simmer: when they begin to soften watch them attentively, feel them with a fork, and as soon as they are easily perforated immediately pour off the water; throw some salt upon them, set them again over the fire in the same vessel, until every particle of remaining moisture is exhausted, and bring them hot as possible to the table.

SECT. XVII. Of Carrots.

THE soil most proper for the cultivation of this useful root is a sandy loam; but they may be raised on many other kinds of soil, when rendered fine and mellow by proper ploughing and harrowing.

A Suffolk farmer observes, that he has sown them after turnips, summer-land barley, and pease set upon a rye-grass lay; that the crop upon the first has generally been most productive; next to that he prefers the latter. In the first place he feeds off the turnips by the beginning of February, and then lays the land up on small balks or furrows, in which state it remains until the second week in March, when it is harrowed down, double-furrowed to the depth of about twelve inches, and the seed sown thereon, at the rate of four pounds and an half to the acre. As soon as the plants appear distinctly, they are set out with a small hoe, at the distance of six inches from each other; they are afterwards hoed twice more at different times, according as the crop seems to require it; and it is not unusual to harrow them between the hoeings, which does no injury to the root, and frequently saves the expence of a third hoeing.

When carrots are intended to be sown after pease, he usually ploughs the stubble as soon as the harvest is over, in order that the land may clear itself of weeds; in December it is laid up in small balks to receive the benefit of the frosts; in February it is harrowed down, and manured at the rate of fifteen loads per acre; the manure is ploughed in to the depth of about four inches, and in the middle of March the land is double-furrowed, and the seed sown. By pursuing this method, he says, the manure lies in the centre of the soil, and not only affords nourishment and support to the carrot in its perpendicular progress, but renders it easy to be turned up by a single ploughing, and greatly promotes the growth of the succeeding crop of barley.

In Norfolk it is the practice to sow carrots after a crop of turnips. The manure, after being put on the land in the beginning of March, is first ploughed in with a common plough, and afterwards trench-ploughed about fourteen or fifteen

inches deep, it is then harrowed very fine, and the seed sown about the middle of March, though the latter end of that month is probably better, as the plants come up nearly as soon as the earlier sown, and are attended with fewer weeds. The carrots are generally ready to hoe in the beginning of May, and, when tolerably free from weeds, may be hoed with large hoes. Carrots are also frequently grown with the same preparations on land where potatoes have grown. The manner in which Mr. Billing cultivated his land for these plants is the following: The wheat and clover stubbles he split down with the plough early in the preceding November, and is satisfied, that whether the wheat stubble be, as it is called in Norfolk, flat work, or in ridges, or the carrots are to be sown after clover or rye-grass, the land cannot be ploughed too early, so that the frost and snow may have their full effect in mellowing the ground for the reception of so small a seed; and this is the more necessary to be attended to, the stiffer and tougher the soil is. He ploughs the wheat and clover stubble three times; but the land on which the turnips have been, but twice; the first shallow, but the last as deep as the staple of the ground will permit; and on this ploughing the carrots are sown.

Sometimes the land is immediately dunged for the carrots, but at other times only for the previous crop: the former is probably the better method. Mr. Billing thinks four pounds of seed an acre is sufficient.

It is generally three weeks after sowing, and sometimes longer, before the carrots appear: and they are frequently seven or eight weeks before they are fit for the hoe, which affords the weeds an opportunity to get strength, in this season, as they grow fast: Mr. Billing is therefore of opinion, that it is better to sow them as late as you can with safety to the crop, as he found those sown in April on clover stubble came much the soonest to the hoe, though later sown.

Where the crop of carrots is very clean, once hoeing may be sufficient; but where the weeds are strong it is necessary to hoe them a second time; but about ten days or a fortnight after the first hoeing, they should be harrowed: this will displace the weeds, and prevent their growing again, which many of them will otherwise probably do, especially if it be showery weather: the harrowing does not hurt the carrot plants, but, on the contrary, does them service, by bringing fresh earth to them, as well as by destroying the weeds. About three weeks after harrowing, in case it has not perfectly cleared the ground of weeds, or in case new weeds spring up, Mr. Billing hoes the carrots a second time; and after this, if there still remain any weeds, which will be the case if much rain falls during the time of the second hoeing, a second harrowing is bestowed. But where the weather has been favourable, and those employed in hoeing have done their duty, the carrots once hoed and harrowed have been as clean as those on which two hoeings and as many harrowings have been practised.

An Essex farmer remarks that carrots will amply repay every expence of the *finest* culture; and should, from their extensive utility, on sound, deep, and friable land, be every where attempted. He sows in March, or April; hoes three times, and harrows after each hoeing; sometimes leaves them in the land till after Christmas, and takes them up as wanted; but lately has taken them up in October, in dry days, put them directly into small *upright* cocks of ten bushels each, *entirely* covered, with the tops cut off; they *thus* appear to dry better than in any other mode; and, with very little loss, to bear the weather. If, after being thus dried, they are carried into any barn, or shed, it will be better, if in large quantities, through the hazard of heating, not to pack them *close*, but rather throw them promiscuously into *beaps*, with a little straw over them. Though this writer's produce, with little

ploughing and no manure, was only on an average about 400 bushels an acre, some of my neighbours (says he), who have been induced to try them, on a rather larger scale, with finer culture, and fresher soil, have raised from six to nine hundred bushels per acre, and applied them more profitably, as well as more generally, than any other winter herbage, to deer, sheep, bullocks, cows, and horses. At the lowest calculation they are, from our trials, esteemed to exceed turnips in value one-third, as to quantity of feed; but are far superior in what arises from convenience. For the stable, where to *us* they seem to be a perfect substitute of corn for all horses, at least not used in any quick work; and partially so, for those that are, when corn is joined with them. If they be given when perfectly dry, no washing of the carrots is, in general, necessary for any cattle, except horses *regularly* kept in the stable.

This is undoubtedly a little additional trouble and expence. They are sown in March; and if the weather continue dry, it is some weeks before this plant appears, and so *very delicate*, as to make the first hoeing, or rather weeding, which must be as early as their strength admits, extremely tedious and troublesome. In about a fortnight their root will be sufficiently fixed to bear harrowing, by which their growth will be promoted, and the land cleaned; and the treading of the horses will not hurt the plants. And in about a fortnight more the second hoeing, to set them out at six inches square, will follow, and a second harrowing; the third, if at all necessary, just as the state of the soil and growth of weeds may require; for as to the carrots, their nourishment is drawn from a bed so much deeper than that of weeds, as not to be at all injured in their progress, though disgraced in their appearance, by them. The carrots may be dug out of the ground with a three-tined fork, or be ploughed up with a narrow-sharred wheel plough: the latter method leaves the land better prepared for the ensuing crop.

In Suffolk, after the carrots are taken up, they lay them in an out-house, and cover them well with straw, to guard them against the frost; though it is not unusual for some farmers to let them continue in the ground until they are wanted, which is less expensive; and the weather must be extremely severe to injure the crown of the root, which is more hardy than either a turnip or potatoe. When they are taken up, care must be taken of the tops, which are equally good with the roots for cows, sheep and hogs.

SECT. XVIII. *Of Parsneps.*

THESE roots require a rich, mellow, and deep soil, in order that they may have full room to thicken and run downward. The seeds of these plants should be sown in February or March, either alone or with carrots, especially if it be intended to draw these last very young; because parsneps seldom spread much before the latter end of summer, by which time the carrots will, in this case, be gone.

It is necessary that the young parsneps be hoed and weeded, or, if they be sown in rows, that the ground between those rows be dug three or four times in the spring, or whenever weeds appear.

When the leaves of this plant begin to decay, the roots may be dug up for use: but they are seldom well tasted before that time; nor are they good late in the spring, after they have shot out again. In order to preserve them for spring use, they should be dug up in the beginning of February, and buried in sand in a dry place, where they will keep good until the middle of April, or even to a later period.

Mr. Hazzard, however, observes, that in order to cultivate this root so as to make it prove advantageous to the farmer, it will be right to sow the seed in the autumn, immediately after it is ripe, or come to perfection; by which means the

plants will appear early the following spring, and will get strong before the weeds can grow to injure them. Frosts never affect the seed, nor do the young plants ever materially suffer through the severity of the seasons. Not only on this account, but for many other reasons, the autumn is preferable to the spring sowing, as the weeds at this time will keep pace with the parsneps; and often when they are hoed or cleaned, great part of the crop is pulled up, cut out, or otherwise destroyed, as they are (when sown in the spring) so small when they first appear, as not easily to be distinguished from the weeds; and if no rains fall at that season, some of the seed will not vegetate till late in the summer; and the few plants that do appear, will scarce pay the expence of cleaning them: besides, they will never grow to any size, but be sticky or cankered, and consequently will be destitute of nutrimental juice; while, on the contrary, those that are sown in the autumn will be large, free from the defects of the others, and fully answer the cultivator's expectations.

He thinks that the best soil for parsneps is a rich deep loam; next to this is sand, or they will thrive well in a black gritty soil; but will never pay for cultivating in stone-brash, gravel, or clay soils; and they always are the largest where the earth is the deepest. Dry light land is pleasing to them, but wet, stiff, or hide-bound land is destructive. If the soil be proper, they do not require much manure. This writer has obtained a very good crop for three successive years, from the same land, without using any; but when he laid at the rate of about forty cart-loads of sand per acre upon a very stiff loam, and ploughed it in, he found it answered very well, from which he concludes that a mixture of soils may be proper for this root. He says it is most advisable to sow the seed in drills about 18 inches distant from each other, that the plants may be the more conveniently hand or horse-hoed; and that they will be more luxuriant if they undergo a second hoeing, and are carefully earthed so as not to cover the leaves with mould.

He advises those who have not ground to spare, or cannot get it in proper condition to receive the seed in the autumn, to sow at that time a plot in their garden, or the corner of some field, and transplant from thence the latter end of the month of April, or early in the May following. The plants must be carefully drawn from the seed-plot, and the land that is to receive them should be well pulverized by harrowing and rolling; and when it is thus ordered, a furrow should be opened with the plough about six or eight inches deep, in which the plants should be regularly laid at about the distance of ten inches from each other, taking care not to let the root be bent, but for the plant to stand perpendicular after the earth is closed about it, which should be immediately done by means of persons who should for this purpose follow the planter with a hoe; and he must not forget that the plants will be injured if the leaves are covered. Another furrow must be opened about 18 inches from the last, in the same direction, and planted as before; and so in like manner till all the plants are deposited, or the field is completely cropped; and when the weeds appear, hoeing will be necessary, and it will also be right afterwards to earth them up.

He thinks it is wrong to plant parsneps by means of dibbling, as the ground thereby becomes so bound as seldom to admit the small lateral fibres with which these plants abound to fix or work in the earth; on which account they are prevented from expanding themselves, and never attain their proper size. But, says he, if people would in general be attentive to the soil, the season for sowing, the cleaning and earthing the plants, and raising their feed from the largest and best parsneps (which should be selected and transplanted for this purpose), there is no doubt but such a crop would answer

much better than a crop of carrots; they are equal if not superior for fattening pigs, as they make their flesh whiter, and they eat them with more satisfaction. When they are clean washed and sliced among bran, horses eat them greedily and thrive therewith. It is also said, that cows and oxen are fond of parsneps: if so, they are certainly well worth a farmer's attention, especially in countries where there is a scarcity of fodder.

SECT. XIX. *Of Cabbages.*

CABBAGES grow extremely well on any loamy soil which is in good heart and made sufficiently fine. For this last purpose the land should be thrown up in the autumn, that it may enjoy all the advantages of a winter and summer fallow; and as these plants extract their nourishment from a considerable depth, as well as from the surface of the soil, it will also be necessary that it should be double-trenched during the time of fallowing. Immediately after harvest, it is to be turned up, and the workman is to go as deep as he can with his plough: another plough is to follow immediately in the same furrow with a higher earth-board, which will cast the mould over, and bury the stubble, if it was not before, by some other method, destroyed: in this manner the field will, as it were, be turned upside down, double spitted more than a foot deep, and the stubble be sooner rotted. The harrows must then make the ground as fine as the season will admit. After this, when the weather will permit of it, double trench the land, and lay it up till the spring in sharp ridges. By these means the ground is rendered extremely mellow, but the process is probably too expensive for general practice. The land being thus properly prepared, the plants are generally set in rows at the distance of about two feet and an half or three feet, and two feet asunder.

In Staffordshire, Mr. Pitt observes that some farmers plant them on three-foot ridges, manured under the rows, with soil left between the rows for one plough-hoeing; the hoeing being afterwards finished by hand. Others plant them without ridging, spread the manure promiscuously, and do all the hoeing by hand.

Some also think cabbages are best grown on the same spot or flat of ground every year, which should be allotted and inclosed for that purpose: others grow them in the turnip field; and they are followed by barley, as it is generally convenient to reserve them for use late in the spring. Sometimes one part of the field is planted with autumnal plants, and the other with spring plants. This (says Mr. Pitt) is the true system, as the former will be large enough for early use, and the latter will stand the winter for use in spring.

In the vicinity of Edinburgh, Mr. Robertson informs us that in preparing for this crop, the ground is ploughed in November, and again in April following, and well reduced by harrowing, &c. It is then laid out in 3 feet drills, 30 carts of dung per acre being laid in the drills, which are then split with the plough covering the dung, and then rolled lengthways, after which the plants are put in, to the quantity of seven thousand two hundred (long hundreds) per Scotch acre, at two feet distance in the rows.

The seed is sown in garden ground, about the first of September, and transplanted to the field in May, or the first of June. While growing, the earth is taken away from the plants by the plough; they are then hand-hoed, and a few days after the earth is again laid to the plants by the plough; and if any weeds appear afterwards they are again hand-hoed. The crop is ready for use by the end of October, and continues all the winter, till the latter end of March or middle of April.

Mr. Boys observes, that the tillage necessary for cabbage in

Kent, is to plough the land in the winter six or seven inches deep, and to cross-plough it in the spring in a dry season; and then, after manuring with a good covering of rotten dung, before planting in June, to plough it again, turning over a furrow ten inches wide; and then, by planting every third furrow, the rows of cabbages will stand two feet and a half apart. The sort for cattle or sheep is the large drum-head, which in good land will grow to an immense size. The seed should be sown the last week in March, on a rich warm border of light soil, where the plants may remain till a showery season in June, when they should be transplanted with small iron trowels, in the following method:—The plants being ready drawn from the seed-bed, a woman attends in the field to dip the roots of the plants in fine mould and water, beat together to the consistence of batter; two others then carry them in handbuls, and strew them in small lumps along the furrows ready for the planters; seven men will keep these three women fully employed: they thrust their trowels with their right hand into the land, in a diagonal direction, with the point towards them; and then, by pulling the handle of the trowel a little towards them, the earth is lifted so as to leave a space to put in the plant with the left hand; the trowel is immediately drawn out, and the earth pressed close to the root of the plant with the handle. The land being ploughed straight, and left unharrowed, there is no occasion for lines to direct the planter. By rolling the surface, after the plants are in, the work is finished. In July and August the crop must be kept clean by horse and hand-hoeing.

Mr. Baker, who has made many experiments on different kinds of cabbages, and detailed them in the Transactions of the Dublin Society, distinguishes them into summer and winter sorts. The summer cabbages are those raised from seed sown in March, and those from seed sown in August, the winter cabbages. The *Drum-head*, or *great Scotch cabbage*, is probably the most productive and hardy of any of the winter sorts.

It is now fully proved by experience, that cabbages are not only very agreeable food for cattle and sheep, but also that they are very nourishing to them. And cows fed upon cabbages give a great deal of milk, but the butter made from it has been objected to. It is now however known, that the bad taste of butter, when the cows feed upon cabbages, is owing to giving them the decayed leaves: for when these decayed leaves are taken off, and only the sound cabbages given to the cows, the milk and butter are perfectly sweet, and of a rich taste. The quantity of food for cattle that they produce is very great; from twenty or thirty to fifty ton and upwards per acre: and some of them continue sound through the winter; and during the months of March, April, and May. This renders them peculiarly valuable: for in these months the winter provision for cattle is mostly spent, and the grass is not then advanced so far as to supply them, often not till the middle of May.

SECT. XX. *Of the Turnip Cabbage.*

THE mode of culture of this plant is pretty similar to that of cabbage. But the earlier the seed is sown in the spring, and consequently the earlier the plants are put out, the better, especially in poor ground. In strong land, and a favourable season, Mr. Broughton observes a good crop may be procured by sowing the first or second week in May. If sown ever so early, they never run to seed the first summer, unless here and there one which has run from its sort. In good ground the rows may be from three to five feet asunder, and the plants not less than three feet in the rows. Great care must be taken not to plant them too deep; and, when hoed, not to draw the mould too high in their stalks. Strict attention must be paid in selecting bulbs for seed, which should always be the cleanest and handsomest; otherwise they are very apt to sport, as it is

termed, or run from their sort. I have taken them up in the spring from the field (says he), and planted them in my garden when they have been sprouting, and the seed has ripened well; but I would prefer letting them remain where they were first planted. It may, therefore, be prudent to plant a small piece for the purpose of seed, and to pull up any irregular or false ones. Of course none of the cabbage tribe should seed near them. He thinks those intended for seed might be planted closer together, without injury to the crop; by which it will allow for pulling up the bad ones with less loss. If any person should wish to cultivate them in his garden, he will find the method above recommended for the field answer his purpose. The bulbs will be fit for use by October, and may be used till they begin to sprout in the spring, at which time the young shoots are very delicate eating. In preparing for the table, the rind, which is very tough and fibrous, must be entirely taken off, and the bulb cut into small pieces, which must be treated as turnips: they will require to be boiled at least two, and sometimes three hours, before they will be sufficiently tender. He has always found them best when boiled with meat, especially with salt beef; and they give a most agreeable flavour to broth.

In the year 1791 (says he) I planted out between 4 and 5000 of these plants into a field, on the top of a hill, on a thin, worn-out, stone-brash soil. The ground was dragged down to a level, some furrows struck at about three feet distance, and a little dung shook into the furrows, which were afterwards closed with a plough. The first dripping day the plants were put out, at about two feet distance in the rows. They took root very readily, and continued to thrive well, notwithstanding the season was very dry. These plants bore the winter, which was rather a severe one, very well, though many turnips on the adjoining land were destroyed. In the spring they were for the most part given to the sheep, which have always appeared to be very fond of them. Part of them were saved for feed, which ripened and were cut about the middle of July. The land upon which those that were given to the sheep grew, as well as the turnip land, was sown with barley; but the former did not appear to be at all exhausted, more than the latter. I think the average weight of the bulbs was about 5lb.; many reached 8 or 9lb. and some few 14 or 15lb. The next year he again planted out about 4000, in a strong stiff loamy soil, and rather wet and low. Where the ground was driest, the plants thrived well; but where it was wet, they made little progress. These were planted out on two-bout ridges, being nearly five feet distant row from row, and about two feet in the ranks. I expect (says he) that these plants will not stand the winter so well as those on the hill did. They appear to me to affect a dry situation: an opinion which corresponds with the experiments made by others. In the latter situation, they appear to produce more leaves in proportion to the size of the bulb, than in the former. He thinks the lower leaves might be cut off late in the fall, and given to young cattle with advantage; as they are otherwise cast during the winter.

He also thinks that these plants possess some advantages over the common turnip. They have a strong power of resisting putrefaction, and of course endure the frost and wet, but particularly the latter, better than most plants. They are much more nutritive than the common turnip; and being of a closer texture, and less watery, they contain more food in a given space. By standing up above the ground on a foot-stalk, they are more readily come at, when the ground is covered with snow. If the ground be in good proof, and they are intended for spring seed, it will be time enough to plant them out the beginning, or even the middle of July; which will give the farmer a long summer to clean his ground. He imagines that they may be reserved almost as late in the spring as you please. He has found the bulbs nearly as firm and sweet, after the seed

has been cut, as before. Their leaves, not being bitter like those of the turnip, are more readily eaten by cattle. Upon the whole, he supposes that they would prove, upon trial, a very valuable article of fodder to the farmer; and as such he recommends them.

The same ingenious writer has made some farther experiments with respect to the culture of this plant. A piece of wheat stubbs, between two and three acres, lying in a small common field, the soil a free-stone grit, worth about eight shillings per acre, was twice ploughed, cleaned, and dunged. It was then ridged up in two-bout ridges, part having their centres three feet distant from each other, and part only two feet. The plants were all set out on the middle of the ridges, and at the distance of three feet from each other in the rows; but at three different times—the first, seed sown the middle of March—the second, seed sown the beginning of April—the third, the end of April. The season was uncommonly dry; few opportunities offered of planting, or making good the numbers that failed from the drought. On a piece of ground adjoining, he purposed having some common turnips to compare with them; but in spite of all his care, and thrice sowing, the crop was so thin, that the ground was afterwards ploughed up and sown with wheat, to his great disappointment. As soon as the plants had got firm root, and had advanced a little in their growth, a furrow was turned with a plough from *each* side of *each* ridge, and the weeds on the remaining part of the ridge, not touched by the plough, were cut up with a hoe. In a fortnight or three weeks afterwards, these furrows were turned back again into their places; by which means the land was kept clean at a small expence, and the growth of the plants greatly promoted.

On the second of December he caused three square *lug* to be cut in three different parts of the piece, and found the weight to be as follows:

No. I. One square lug, ridges somewhat more than three feet, plants three feet in the rows, seed sown middle of March, weight - - - -	lbs. 230
No. II. One square lug, ridges barely three feet, plants three feet in rows, seed sown beginning of April, weight - - - -	260
No. III. One square lug, ridges about two feet, plants three feet in rows, seed sown end of April, weight - - - -	260

The inferiority of No. I. was not, he believes, owing to early sowing, but more of that plantation failed than of the others; and no opportunity offering to replace them for nearly six weeks, the plants in the seed-bed were stunted in their growth by the drought, and never thrived well afterwards: nearly a fourth of the bulbs in the first *lug* were of this description. Had it been otherwise, he believes the first would have been the best. He computes the average weight at somewhat more than eighteen tons per acre. It is remarkable that numbers II. and III. should be exactly equal in weight, the rows

in one case being three feet, in the other two feet asunder: but it is worth observing, that the weight of the leaves, in proportion to that of the bulbs, for he weighed them separately, was greater in those at two feet than in those at three feet.

From the whole of his experience, he recommends this plant very earnestly to the attention of farmers; and thinks that it will be found, under proper management, one of the best hitherto cultivated, especially as a *late spring food*.

He concludes that the earliest season for sowing is the best, if the land can be got ready; but any time in April, or even the beginning of May, will answer perfectly well, if the season be not uncommonly dry at the time of planting: and he thinks three feet square the best distance for the plants. The greatest attention however should be paid to saving seed only from the very best bulbs.

Mr. Robins observes, that the best method he has yet discovered to raise the plants of the *turnip-rooted cabbage*, is to breast-plough, and turn as much old pasture as may be judged necessary for the seed-bed; two perch well stocked with plants will be sufficient to plant an acre. The land should be dug as shallow as possible, turning the ashes in; and the seed should be sown the beginning of April. The land intended for the plantation should be cultivated and dunged as for the common turnip. About Midsummer (or sooner if the weather will permit) will be a proper time for planting, which is best done in the following manner: The land to be thrown into *one-bout* ridges, upon the tops of which the plants are to be set, at about eighteen inches distance from each other. As soon as the weeds rise, says he, I give a hand-hoeing, afterwards plough in the intervals, and fetch a furrow from each ridge, which, after laying a fortnight or three weeks, is again thrown back to the ridges: if the weeds rise again, I think it necessary to give them another hand-hoeing.

Mr. Boys thinks this a most valuable plant, and that every farmer who keeps sheep should have a small piece to eat off in the month of April, after turnips are gone, and before there is a plenty of other herbage. The severest winters do not hurt it; and it produces a great quantity of nutritive and wholesome food: it is however an exhausting crop, and expensive to get out of the ground; but its great value, as a plentiful supply of good food for stock, when, in some seasons, there is nothing else to be had, is more than sufficient to counterbalance every thing that can be said against it.

In order to obviate some of the objections which have been made to these roots, it will be proper to sow them on rich and very light land; and as they are longer after being sown in coming to the hoe, than the common turnips, it will be necessary to sow them much earlier.

Mr. Baker, an ingenious writer on this subject, gives the following table, as the most proper distances for producing the greatest crops, from his own observation and experience of the growth of each sort.

Table of Distances for Cabbage Husbandry.

Kinds.	Season.	Distance used.	Distance recommended.
The long-sided cabbage	winter plants	2 feet by 5 feet	2 feet by 4 feet, or 18 inches by 4 feet
The flat Dutch cabbage	ditto.	2 5	2 feet by 4 feet, or 18 inches by 4 feet
Ditto	spring plants	2 5	18 inches by 4 feet
The Scotch cabbage	winter plants	2 5	2 feet by 4 feet, or 18 inches by 4 feet
Ditto	spring plants	3 $\frac{1}{2}$ 5	18 inches by 4 feet
The turnip cabbage	ditto.	18 5	1 foot by 4 feet

There is another plant of this kind which may be just mentioned here; it is the *Mowing Cabbage*, which however seems better calculated for culinary uses than for cattle.

SECT. XXI. Of Mangel Wurzel.

THIS plant, though now probably not held in so high estimation as formerly, is certainly very useful in feeding stock.

The land for it should be rendered fine by frequent ploughing and harrowing, and be made perfectly free from weeds. It must then be formed into two-bout ridges, which makes them about three feet wide from the middle of one furrow to that of another; the tops of the ridges about two feet, and the furrow or interval between them one. By this method the mould on the ridges is laid considerably thicker, which is a great advantage to tap-rooted plants of every kind. In the middle of each of these ridges the seed should be dropped eight or nine inches apart, and one good seed only in a hole. Supposing all should grow, then the plants would stand three feet row from row, and at eight or nine inches distance in the rows; but this would be just double the number of plants necessary; for 16 or 18 inches is quite near enough. Sufficient, therefore, might be drawn from these to supply the deficiencies that would necessarily happen from imperfect seeds, &c. and if not wanted might be easily cut up with the weeds in hand-hoeing, for they should by no means be suffered to stand too thick. By being planted in this manner at the distance of three feet row from row, the intervals by horse-hoeing may be kept perfectly clean, and the ground between the plants equally so by hand-hoeing.

The best time for sowing the seed must depend upon the weather; but from the beginning of April to the middle of May seems the most desirable.

In the cultivation of this root Sir M. Martin advises such a preparation of the seed as may make it grow faster than the seeds of weeds latent in the ground, in order to facilitate their first hoeing, which he says at best is troublesome, as the plants grow slow while young; and there are two or three seeds in every little lump, which cannot be separated till the plants are strong enough to stand against the hoe, which they will be at the second hoeing. The most rational means of forwarding the growth of the seed, he observes, is to bury it too deep to vegetate, which is the state the seeds of those weeds are in, which grow as soon as they are brought within the influence of the air. For if they are sprouted before they are sown, and a few dry days should follow, they would probably perish. In this case he thinks it would be advisable to sow them deeper than would otherwise be necessary; for he has had many young plants appear the second year, which he attributes to the seed having been buried too deep the first. He thinks the seed being near the surface contributes to make the roots rise above ground.

Mr. Wimpey, a very ingenious farmer, observes, that though in general he has no great opinion of transplanting tap-rooted plants, especially such whose roots constitute the principal part of the produce, yet he knows not if, upon the whole, this would not be the most profitable method of cultivating this plant. In that case, the seeds should be sown in a nursery-bed as early in March as the season will admit, and in the interim between sowing and transplanting the ridges should be well prepared for the reception of the plants. The advantage of being removed into a clean well-pulverized soil is great indeed, if a favourable season be taken for that business. It is the method he has followed for several years with the turnip-rooted cabbage, and he is well convinced that it is the most profitable and economical of any usage in practice. It may, says he, perhaps, be thought by some too laborious and expensive; but if they would make the experiment, they would soon be convinced of the contrary. A dexterous labourer would set a large piece of ground in a day, and when set they would be done with, all but weeding; for, being planted at due and regular distances, the whole of the operation is finished at once. But if the seeds are sown or dropt, the plants must be set out to a proper distance; which would be found to be as expensive as transplanting, and the ground by no means so clean and in such perfect condition as it must be made for transplanting.

The difficult question is, whether the roots of the transplanted would be equally fine with those which had never been removed. This, from some observations he has made, seems to depend much upon the age and size of the plants when they are removed. The root in its first growth pretty much resembles the carrot; and if it be drawn when not above three or at most four inches long, and the hole in which it is to be planted be made deep enough to receive it without bending or distorting it, the root will receive no injury; but if it be bent, broken, or twisted, it will certainly occasion an unnatural shape, and he fears diminish its size.

Mr. Wimpey's remarks on feeding animals with them are these: The leaves, says he, were cut clean off about an inch above the crown of the root every morning, and given fresh to the pigs two or three times a day. It is not easy to describe how voraciously they ate them. Mr. Wimpey knows of no food they are equally fond of. Even the hogs that were fattening would often leave their pease and barley-meal, to feed on the leaves of the mangel wurzel. The cows also ate them with an exceeding good appetite, and were certainly very desirous of them. After harvest, he observes, the weaned calves were turned into the field, at one end of which they grew: they soon found them out, feasted deliciously upon them, and were manifestly improved by them. During the time the plants were growing, I often, says he, gave a few of the roots and greens together: but neither cows nor pigs were at all fond of the roots in that stage of their growth; they always left the greatest part of them. This circumstance alarmed me; but was entirely done away in the winter, for then both cows and pigs ate them as kindly as they would have done any food whatever. The roots in general were so hard and firm, that he found it necessary to have them cut in slices; which a labourer did with a small bill-hook on a tressel, and could cut several bushels in an hour. The greatest inconvenience that attends them, he observes, is the great quantity of mould that so firmly adheres to them. The roots are covered with innumerable fibres, which embrace the mould too firmly to be easily separated from it. This he says is a matter of no great signification in feeding hogs, who are constantly delving in the dirt; but perhaps it is not quite so clear that in time it might not prove injurious to cow cattle. As his cows and pigs were fed with them promiscuously together with other food, he was unable to ascertain what would be the amount of the produce on any given quantity of land valued in money; but he is pretty certain, that an acre of land planted as above, would well maintain twenty store pigs from six to eight months, and in that time their improvement could not be less than 14 or 15s. a pig. The labour of preparing this article of food would, he thinks, be a considerable deduction from the sum, whatever might be the amount.

It would, however, afford a very large quantity of desirable food for six months out of the twelve; from the beginning of July to the end of December; and in a favourable season, two or three months longer. But in severe winters, he is afraid there can be no dependance upon it after Christmas, unless means similar to those used to preserve potatoes be adopted for its preservation. But still in his opinion, it must be allowed to be a very valuable article of culture, and well worthy the attention of the husbandman.

SECT. XXII. *Of Grasses.*

THESE should be chosen agreeably to the nature of the soil on which they are to be sown. The proper season for sowing these seeds is the latter end of August, and beginning of September, in order that the grass may be well rooted before the frost sets in. The sowing should be performed in moist weather, or when there is a prospect of showers, that the grass

may soon get up. But, where this cannot be performed in autumn, the seeds may be sown in the spring; and about the middle of March will be a good time, should the season prove suitable.

Land on which grass-feed is intended to be sown, should be well ploughed, and cleared from the roots of noxious weeds, such as *couch-grass*, *fern*, *rusches*, *beath*, *gorse*, *broom*, *rest-harrow*, &c. which, if left in the ground, soon get the better of the grass, and over-run the land. Where the ground is low, wet, and of a stiff clayey nature, it will also be necessary to render it dry by proper draining. And before the seed is sown, the surface of the ground should be made as level and fine as possible, otherwise the seed will be unequally buried. The quantity of grass-feed for an acre of land is generally three bushels when the seed is clean, but when otherwise, a much greater quantity must be allowed. After the seed is sown, it must be gently harrowed in, and the ground rolled with a wooden roller.

The kinds of grass seeds that Doctor Anderson recommends for waste lands brought into a state of cultivation are, *white clover*, *yellow clover*, and *rye-grass seeds*, in the proportions of ten pounds of each of the two first, and two bushels of the last per acre. If *yarrow-seeds* are to be had, four or five pounds of these may be added, diminishing the rye grass half a bushel. On spongy, wet, mossy land, six or eight pounds of rib grass may be substituted in the place of so much of the *yellow clover*. Red clover is omitted, because it is a short-lived plant, and its broad leaves' overshadowing other grasses is liable to choke them, and encourage weeds to come up.

The practice of sowing all kinds of rubbish promiscuously, under the name of *hay-seeds*, he considers as justly exploded.

Mr. Boys however remarks, that the only good method, until the best sorts of grasses are cultivated for sale, is to save for seed a piece of fine old meadow hay, that is known to abound in the best sorts of grass, by letting it stand about three or four weeks longer than it should when intended to be mown for hay. When it is mown and ripe, it must be thrashed on a sail-cloth in the field, and immediately sown on the piece of land intended for the new pasture; which should, by a good summer-fallow, be brought into fine tilth to receive the seed. This, with ten or twelve pounds of white clover, he says, will make an excellent meadow.

Rye-Grass. This grass is commonly sown with clover, upon such lands as are designed to be ploughed again in a few years. It is also frequently sown with spring corn. The quantity of seed which is allowed to an acre is about two bushels, with eight pounds of the common clover, which, together, make a very good covering upon the ground.

In some places, rye-grass is preferred to hop clover, as bearing the winter better, and keeping a good head, which clover does not. But although rye-grass will maintain as many cattle on an acre as hop clover; it does not, like it, improve the land for a subsequent crop of corn.

Doctor Anderson however thinks, that besides the recommendation of this grass from the facility of obtaining its seeds, it has so many other valuable qualities to recommend it, that he considers every circumstance which tends to circumscribe its use as a national misfortune. It is a grass, says he, that is liked by almost every domestic animal above all others. It springs up very early in the season, furnishes a vast abundance of herbage, and thrives on almost every soil. On very poor lands, indeed, it produces a much more scanty crop than on such as are richer.

Mr. Peacey observes, that it is very nourishing, and grateful to all kinds of stock; as may be seen where they have a choice of that and other pastures to run in; the natural pastures will be quite neglected, whilst the rye-grass will be pared close to the ground: indeed it requires to be hard stocked; for if suffered

to get a-head, it is neither so palatable nor nourishing: it is equally excellent for hay, if cut just as the ear appears, and before it is fully formed: in the autumn it likewise affords a great deal of keep. It rather improves with age, and has been found particularly advantageous in laying land down to permanent pasture.

Sheep's Fescue Grass. This is an excellent grass, which flourishes best in a dry sandy soil. Cows, horses, and goats will eat it, but it is the favourite food of sheep. They prefer it to all other grasses; and being very succulent, it fattens them sooner than any other. This grass is much esteemed for the food of sheep in Sweden. It abounds in many parts of England and Wales, particularly on all the finest sheep-pastures in Herefordshire, Oxfordshire, Norfolk, &c. It is a very early grass.

Purple Fescue Grass. This grass is frequently met with on the downs and hills in great plenty, where it affords an excellent pasture for sheep.

Creeping Soft Grass. This is a meadow grass, which affords a very sweet and fine herbage.

Clover. Different sorts of this plant are cultivated, as the *red*, the *white*, and the *hop-clover*. *Red clover* is said to thrive best on a firm heavy soil. By the frequent sowing of this seed, the quantity of food for cattle has been much increased, especially on clayey lands, which, before the introduction of this practice, produced very little. At the same time it enriches the soil, and prepares it for a crop of grain; and it is now indeed common, where the land is kept in tillage, to lay down the ground with clover, after having had two crops of corn, whereby there is a constant rotation of wheat, barley, clover, or turnips, on the same land. The clover-seed is generally sown with the barley in the spring; and when the barley is taken off, the clover spreads and covers the ground; and this remains two years, after which the land is ploughed again for some kind of grain.

The roots of this plant decay after they have produced seeds; but by eating the clover down, or mowing it, when it begins to flower, the roots are made to send out new shoots, and the plant continued longer than it usually does. The common allowance of seed for an acre of ground is ten pounds. In the choice of the seed, that which is of a bright yellow colour, inclining to brown, is to be preferred; but the pale-coloured thin seed should be rejected. The clover-seed should be sown after the barley is harrowed in, otherwise it will be buried too deep; and after the seeds are sown, the ground should be rolled, which will press the seeds into the ground: but this should be done in dry weather, for moisture will often cause the seeds to burst; and when the ground is wet, the seeds will stick to the roller. The above is the method generally practiced by most people, in sowing this seed with corn; but it will be much better if sown alone; for the corn prevents the growth of the plants till it is mowed and taken off the ground, so that one whole season is lost; and many times, if there be a great crop of corn upon the ground, it spoils the clover so that it is hardly worth standing; whereas, when it is sown without any other seed, the plants will come up more equal, and come on much faster than that which was sown the spring before under corn. It is therefore sometimes advisable to sow the seed in August, when there is a prospect of rain soon after; for as the ground is at that season warm, so the first shower of rain will bring up the plants, and these will have time enough to get strength before winter: and if the clover be well rolled some time in October, when the ground is not too wet, it will press the ground close to the roots, and cause the plants to send out more shoots: the same should be repeated in March, which will be found very serviceable to the clover. The reason of preferring this season to the spring, for sowing this seed, is, because the ground is cold and wet in

spring; and if much rain falls after the seeds are sown, they are liable to rot in the ground.

However, the most usual time of sowing the *red* or *broad* clover is in the spring; for though it will come up well if sown in autumn, it is, while young, very liable to be killed by frost; and many crops which have come up finely in autumn, have been totally destroyed by the frost in winter, particularly in strong moist soils, where the greatest crops are commonly produced when sown in the spring. Towards the latter end of May, or beginning of June, this grass will be fit to cut, when great care must be taken in making it into hay, as it requires more labour and time to dry than common grass. The proper time for cutting is when it begins to flower.

Some farmers cut two or three crops in one year of this grass; but it is better to cut only one in the spring, and feed it the remaining part of the year.

Great care should be taken of the cattle when they are first put into this grass, lest they eat too much.

When the seeds of clover are intended to be saved, the first crop in the spring should be permitted to stand until they are ripe, which may be known by the stalks and heads changing to a brown colour: it should then be cut in a dry time, and, after being well dried, housed till winter, when the seeds should be threshed out. If, however, seeds be wanted for immediate sowing, it may be threshed before it be housed or stacked.

In Kent, this clover is sown among barley or oats, in the spring, upon land that is clean and in good order. It is sometimes mown three or even four times in the summer, on rich warm soils; but the general custom is to mow the first growth and feed the remainder, or to feed it at first to the beginning of June, and then save it for a crop of seed. Sometimes also two crops of hay are taken, and on poor land farms much clover is fed off with flocks of sheep, entirely folding the land over for wheat; for which crop no tilth whatever is so good and advantageous.

Doctor Anderson thinks, that where any reliance is to be had on broad clover for a *second* year's crop, it is advisable to sow with the clover a proportion of rye-grass. This is a very profitable practice, as it much augments the weight of the first cutting, and makes it come some weeks earlier than otherwise it would have been. It also effectually prevents the *white* *gozvans* from appearing, which so often render a crop of red clover, sown alone, worth very little. And as the clover afterwards advances much more quickly than the rye-grass, the succeeding cuttings are as good as if no rye-grass had been sown. In order to guard the clover too, in the case of a second year's crop, it should never be cut very late in the season, for this makes the surface so bare as to leave the roots very much exposed to danger; but if it be cut pretty early in autumn, the rye-grass advances again in the end of the season, after the clover has become stationary, so as to afford a close covering that defends the roots pretty well. By these precautions, he has been seldom disappointed in his second year's crop of clover, though it *sometimes* disappears almost entirely. He does not think it possible in Scotland ever to guard against this accident *with certainty*, where broad clover alone is sown: he therefore considers it imprudent in any one, in almost any circumstances, to rely on that *second year's crop*; and holds it as a maxim, that if a man is to depend on red clover alone, he never should think of taking above one year's crop of it. The rule which he has followed to guard against accidents of this sort, is, to sow along with the red clover a considerable proportion of the white or Dutch clover, and some grass. If the broad clover flourishes, these do not retard its growth, and only tend to thicken it; and if it should fail, which it sometimes will do in spite of every precaution, these plants fill the ground, and produce an abundant crop of herbage, which af-

fords a greater weight and finer hay than broad clover alone: though they do not answer quite so well for cutting for green forage.

In Lancashire, Mr. Holt observes, that this sort of grass is cultivated generally with success; being greatly preferred to the white hay, by those who keep horses in the great towns for the draught; containing, it is supposed, more nutriment. If opportunity offers, instead of sending their horses to graze upon a field, which is difficult to obtain, a lot of green clover is purchased, and brought in that state to the consumer, who soils his horses in the stable for a few weeks in the year; and it acts both as food and physic, and enables them to stand work the better. Some few farmers keep their cart-horses in the house throughout the year, and soil them in summer entirely with clover. The lands upon which clovers have been frequently grown, it is said, do not yield such plentiful crops as they did some years past; second crops, in this northern climate, are seldom worth the risk of being made into hay, and, besides, are thought to exhaust the lands, therefore are generally pastured. But marle will always insure clover; therefore when it fails it is the fault of the husbandman, not of the land.

White Clover. This grows naturally in many pastures. Its branches trail upon the ground, and send out roots from every joint; consequently thicken, and make the closest sward of any of the sown grasses.

From these circumstances it is not so apt to be thrown out as red clover; nor is it ever destroyed by any accident, if the earth be rich and firm: frequent rolling makes it flourish abundantly, even on light soils; but without that, on such soils it inevitably perishes. It is a very sweet feed for all sorts of cattle: therefore, when land is laid down for pasture, with intent to continue so, it should be sown with seeds of this kind. The general allowance of this seed is eight pounds to one acre of land: but it should never be sown with corn; for, if there is a crop of corn, the grass will be so weak under it as to be scarce worth any thing. But if this seed be sown in the spring without corn, there will be a crop of hay to mow by the middle, or latter end of July, and a good after-feed for cattle the following autumn and winter. The seed of this sort of clover may also be sown in autumn, in the manner directed for red clover. This autumnal sowing, if the seeds grow kindly, will afford a good early crop of hay the following spring; and if, after the hay is taken off the land, the ground be well rolled, it will cause the clover to mat close under the ground, and become a thick sward. The seed of this kind of clover may be procured by pursuing the same method as is practised for *red* *clover*.

Hop Clover. This kind of clover is highly advantageous, from its growing and flourishing on almost any kind of soil, and on the most barren sands, and being therefore a very proper grass to cultivate on those unfertile soils where other grasses that are worth notice will not grow at all. It does not swell cattle as the red clover does. In good ground it continues long, and bears very good crops.

Trefoil. This is sown in some places on chalky and other poor dry soils in the spring, with other grains, in the proportion of about two gallons of seed to the acre, and the crop affords a very fine food for sheep to graze in the summer months. In Kent, when it is intended for seed, the crop is mown about the first or second week in July; and is frequently thrashed off the straw in the field on a sail cloth.

Sainfoin. Most dry lands will produce this plant, though it thrives best on a fine rich soil. Mr. Kent says it should be introduced where there is a chalky, marley, or even a gravelly bottom. For this seed, in the Isle of Thanet, the land is always exceedingly well prepared, before the seed is put into the

ground, by frequent ploughings, and the weeds or roots of grafs are carefully picked off. Grafs is a very great enemy to this plant, for without the utmost care it soon chokes and destroys it. The seed is sown in April, according as the season suits: dry weather is best, provided it does not long continue. The quantity of seed allowed to an acre is five bushels: of course it is sown very thick. When it is come up, it is carefully hoed and weeded, to keep the common grafs down.

When this crop takes it is very advantageous, yielding plenty of excellent fodder for many years. It is customary in some places for farmers, when they intend breaking up a sainfoin lay, to feed it the last three or four years.

In Gloucestershire, where this grafs is much cultivated, the usual management has been to sow it with barley, after turnips, three bushels per acre, to which is generally added about five pounds of trefoil; which generally improves the first year's produce, and, by occupying the soil, prevents the weeds from getting a-head till the sainfoin has established its roots. There are some very superior managers, however, who, having been induced from an accidental occurrence to think a different procedure would be more advantageous, tried it with so much success, that they have constantly adhered to it since. The method alluded to, is to sow it on land exhausted by repeated cropping, and full of couch grafs: the sainfoin, rooting so deep, does not draw its nourishment like corn from the surface soil, and therefore is not injured by its impoverished state; whilst its greatest enemy, the black bent, is effectually kept under by the couch grafs. In this practice it is likewise sown with barley, and very thin, not more than a bushel per acre; it having been noticed by the same attentive observers, that, when sown thin, the roots are larger and more vigorous, and in two or three years get full possession of the land, producing greater crops, and lasting longer than the thicker planted. There are other cultivators who object to thin sowing, observing that the hay being chiefly wanted for sheep, although it may produce as much or more in quantity, the stems are much larger, and not so palatable to that animal, occasioning great waste in the consumption. But the method of sowing it on foul exhausted land, has in many instances failed of success. The duration of sainfoin depends a great deal on the management: mowing it before its full blossom is detrimental, the roots bleeding very much and mildewing: for the same reason, feeding of it is accounted beneficial: if wished to last, it should never be fed but in the months of October and November, and then only with cattle, sheep biting too close: the lattermath is, however, excellent food for weaned lambs, and therefore often applied to that purpose. Indeed the farmers in general do not wish it to last longer than seven years; the land being in that time thoroughly rested and fit for corn, whilst other land under the plough wants rest; but if desired, it might, with proper management, last ten or twelve years. The hay, if well made, is, in the fore-part of the season, equal to any meadow hay in this county for most purposes. When worn out, so as not to be worth mowing, it is generally pastured a year or two before it is broken up, for the purpose of thickening the grafs.

Mr. Wimpey observes, that whatever crop precedes the planting sainfoin, the ground should be ploughed in the winter, and laid up in sharp deep ridges by one bout of the plough, to continue till the beginning of April. Then it should be dragged and harrowed level: and if the land be very poor, it should have some light dressing of ashes, foot, or a compost of lime, earth, and rotten dung, well incorporated together. A small quantity of either of these would greatly encourage the plants in their infant state. The beginning or middle of April, as the season may prove, the seed should be sown, and there will be little danger of its succeeding well. He thinks that there can-

not be a better nor a surer means of cultivating this useful plant to great advantage, than by sowing it after potatoes. The horse and hand-hoeing them during their growth, and the ploughing, dragging, and harrowing the ground to clean it of the potatoes, so thoroughly destroy the weeds, and pulverize the soil, that it is made in the most perfect condition for a crop of sainfoin; and though the land may in its nature be very poor, the manuring properly for a crop of potatoes, and that being grown perfectly rotten, the soil is become sufficiently fertile for this plant. One acre of good sainfoin, he says, is of more value to the farmer than two of middling meadow or pasture.

Mr. Boys, in his Survey of the Agriculture of Kent, considers this as the most valuable of all the grasses cultivated in that county. It is, he says, much grown on the chalk-land of the eastern part, and is sown among Lent-corn on clean land, at from four to five and a half bushels per acre. It is mown for hay in June, and its produce is from ten to sixty hundred weight of dried hay, fit to stack, per acre. Those who cultivate this plant should observe, that if it be fed off with sheep, it is very soon destroyed; whereas, if sown on clean dry land, after a good summer-fallow, and preserved from sheep, it will last in the ground ten or twelve years. The aftermath is excellent to feed cattle, and the produce is sometimes very abundant indeed.

Lucern. This will grow on almost any soil, provided it be not too wet; but the strongest land is to be preferred. The ground should be prepared in the same way as for barley, by ploughing, harrowing, and cleaning it from weeds. This being done, the lucern is generally sown broad-cast in fine weather, in the proportion of about fourteen pounds to the acre. This quantity of seed will be sufficient to supply the number of plants that will be wanted to yield a full crop.

Before the last ploughing, the land should be manured, but not with old rotten stuff as is commonly done, but with fresh stable-dung, that has been thrown up in a heap three or four weeks to heat and ferment. The dung in this state is to be laid on the land and ploughed in as soon as possible. The land must then be harrowed and sown, and afterwards harrowed again with a light or bush harrow; and, lastly, rolled to settle the ground and break the clods. This seed may be sown from the beginning of March to the end of May; but April, if the weather be dry, is probably the best season.

Mr. Boys observes, that this is a very valuable plant to cultivate on dry lands, for soiling horses in the summer months; but that in Kent it is seldom made into hay. The tillage required for it, he says, is a well-made summer fallow, ploughed as deep as possible, with a good covering of manure. It is generally sown with a thin crop of barley, from 16 to 20 pounds per acre: coal-ashes or foot are sown over the crop in the spring, and sometimes a covering of rotten dung is spread upon it early in the winter. The produce from dry good land is very abundant, and four crops are usually obtained in one summer.

Lucern evidently requires to be constantly kept clean, and manured now and then. By some it is thought to answer the best when transplanted.

It is preferable to any other grafs for horses, cows, and all black cattle, to be cut and carried to them to eat. It is asserted, that an acre of it in good ground, where it thrives well, will, from early in May to Michaelmas, maintain twice the number of cattle that an acre of good meadow will do.

Burnet. Mr. Pitt says, that in Staffordshire this grafs has been sown by many persons of late years, and by some on a broad scale; and he knows it from experience to be a valuable addition to cow pastures, hardy, and strictly perennial. Cows prefer it to clover, and it is doubtless wholesome for them: sheep and horses prefer clover; and it is by no means so pro-

ductive as the broad-leaved red clover. A very attentive friend and neighbour of mine, says he, who keeps a very large dairy, and has for some years back sown large quantities of this plant, is so very partial to it, that he would this year have sown ten hundred weight of the seed, could he have procured it. It is certainly a good mixture with other herbage, with which it but little interferes, drawing its nourishment deep from the earth by a long tap root. It is a native of some of the midland counties, upon dry calcareous soils, particularly Rutlandshire, where it abounds spontaneously in common-fields, road-sides, and even upon commons wholly uncultivated. It is a very different plant to the meadow burnet, springing out and flowering some months earlier.

Mr. Boys however observes, that it grows naturally on chalky soils, and affords herbage in the winter and spring months, but which is not much liked either by cattle or sheep. When necessary to cultivate it, it is sown, about one bushel and a half or two bushels per acre, among barley or oats.

SECT. XXIII. Of Seeds.

IN some parts of the island plants are cultivated for the purpose of their seed, as well as affording support for a great variety of animals. Where this is the object, very little difference is necessary in their management, except in the manner of reaping or cutting them, and the preservation of their seeds.

Rape or Cole-Seed. This plant is cultivated both for its seed and for the feeding of cattle. Rape will grow well on almost any soil, but succeeds best on those that are deep, with a clayey bottom, and on which manuring and deep ploughing have been practised.

In Essex they generally plough up the fallow early in the spring, and let it lie till the latter end of March; they then plough it again, after which they harrow it down, and lay on a coat of manure. After this is spread, they cross-plough it again in May, and get it in fine tilth by the end of June or thereabouts. In ploughing for the sowing of rape, the plough should go north and south, if the field will admit of it; as in that case the land when sown will lie full-faced to the sun. About the first of July, or the first rain after that time, they sow the seed in the proportion of about half a peck to an acre. It is scattered with three-fingers broadcast, and the land lightly harrowed and rolled. In September they hoe it in the same manner as turnips, setting the plants out at about a foot distance, and clear out the weeds. This hoeing is done at the expence of about three shillings an acre, renders the plants much stronger than they otherwise would be, and makes them produce more seed. If any part of the field misg, they fill it up with plants from the thicker parts in the latter end of October, or beginning of November, which answers much better than transplanting them in January; for in the latter case, should a sharp frost succeed, they would be mostly killed, from not being rooted; otherwise the severest frost in this climate does not hurt them.

In other places, the time of sowing rape broad-cast is the latter end of May or beginning of June; the land, previous to sowing, being twice ploughed and well pulverized. About two pounds of clean seed is sufficient for every acre, which should be cast upon the ground as equally as possible. When the plants come up too thick, a pair of light harrows are sometimes drawn length-ways and cross-ways over the land: this thins them equally; and when the plants thus pulled up are withered, the ground is rolled, and a few days after the plants are set out with a hoe, at the distance of 16 or 18 inches.

In some parts of the north of England, the farmers pare and burn pasture lands, and sow them with rape after one ploughing, and by this means have a good crop.

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In the Agricultural Survey of Kent it is remarked, that this seed is much cultivated on the poor lands of the eastern part of that county, under the same management as turnips; but that it is seldom hoed, and consequently much over-run with charlock. Sometimes, although rarely, it is sown for seed; but most commonly fed off with lean flocks of sheep. Cattle and sheep, when poor, are however very subject to be destroyed by eating greedily of this plant.

Some writers recommend the transplanting of rape. For this purpose a piece of ground must be sown about the middle of June; and when the plants are ready, the best of them may be collected and set upon lands which have been previously cropped with wheat, &c. One ploughing only is here necessary. The planting should be on ridges about two feet asunder, and a foot and a half apart in the rows. This business is generally done about the middle of August; but if it were done earlier, it would probably be better.

When the young plants are attacked by the flugs, who prey on them greedily, it is a good way to strew over the plants a mixture of slaked lime and wood-ashes; ten bushels of lime, and fifteen of ashes, are enough for an acre. This both destroys the insects, and promotes the growth of the crop.

Rape, when ripe, is cut and laid thin to dry, then threshed in the field on a large cloth spread for the purpose. When the seed is large, black, and without any red, it is said to be good. If it be kept long, it should be laid in a dry place.

This seed is frequently sown merely for the purpose of a winter feed for cattle. It is an extremely fattening food for sheep. They frequently thrive more on rape-feed plants in one month, than on turnips in two, if put in soon after Michaelmas. In this case, when the crop is fed off, the land is ploughed up early in the spring, and a good crop of barley produced. This method is not however generally practised; as it is troublesome to clear the land of the rape-feed plants.

Coriander Seed. This seed is not at present much cultivated in this country. It might, however, be grown with advantage in the neighbourhood of large towns. It should be sowed in autumn on rich land; and when the plants are come up, they should be hoed out to about four inches distance, every way, clearing them from weeds. By this management, the plants will grow strong, and produce a great quantity of good seed.

Canary Seed. In Kent, where this seed is much cultivated, Mr. Boys says there are three kinds of tilths for it, viz. summer-fallow, bean-stubble, and clover-lay; the last he considers the best. If the land is not very rich, a coat of rotten dung is frequently spread for it. Whether manured or not, the tillage necessary is to plough the land the first opportunity that offers after wheat-sowing is done; and, as soon as the land is tolerably dry in the spring, furrows are made about eleven or twelve inches apart, and the seed is sown broad-cast, about four or five gallons per acre, and well harrowed in. When the blade appears, and the rows are distinct, the intervals are immediately hoed with a Dutch hoe, and afterwards, in May or June, the hoeing is repeated with a common hoe; carefully cutting up every weed, and thinning the plants in the furrows, if they are too thick. It is cut in the harvest, which is always later than any corn-crop, with a hook, called a *twibil* and a *hink*; by which it is laid in lumps, or wads, of about half a sheaf of each. The seed clings remarkably to the husk; and in order to detach it, the crop must be left a long time on the ground to receive moisture sufficient to destroy the texture of the envelopment, otherwise it would be hardly possible to thrash out the seed. The wads are turned from time to time, to have the full benefit of the rains and sun.

Radish Seed. For this crop the land should be clean, full of manure, and ploughed a good depth in the early part of the winter. In Kent, they cultivate the early *Short Top*, the

Salmon, and the *Turnip rooted*. The seed is sown on furrows, about ten inches apart, in a dry time in the month of March, about two or three gallons per acre. As soon as the plants appear, every other row is cut up with a horse-hoe, leaving the rows twenty inches apart. When the plants get two or three rough leaves, they are hoed out in rows, and are then kept clean by repeated horse and hand-hoeing, when necessary, leaving the plants at about eighteen inches distance. The crop is seldom fit to reap till October, and sometimes is out in the fields till Christmas, without receiving injury from wet weather; it being necessary that it should have much rain to rot the pods, that it may thrash well. The produce is from eight to twenty-four bushels per acre.

Spinach Seed. Two sorts of this seed are cultivated, the prickly and the round: both are sown in furrows, about twelve or fourteen inches apart; the prickly, six gallons per acre, and the round four. Early in March, when the plants have leaves about an inch or two in length, they are hoed out to the distance of four or five inches. When the crop is in full bloom, the greater part of the male plants are drawn out by hand, and given profitably to young pigs; by which operation the female plants have more room to grow, and perfect their seed. The crop, when ripe, is pulled up, and thrashed in the field on a cloth, or carried to the barn for that purpose.

SECT. XXIV. Of Hemp.

HEMP is cultivated to the greatest advantage on a soft, rich, loamy soil, which is in fine condition, and well manured.

As it is necessary to have the ground in exceeding fine tilth for this crop, the first ploughing should be given it as early in the autumn as possible; and it should be loosened very deep, and laid rough, that it may be the better mellowed by the winter's frost, especially if the soil be strong. And it should be ploughed again in February, or more early if the season will permit, when the manure is to be laid on. Horse-dung, or the scouring of ponds and ditches, are preferable to cow-dung, though all manures which render the earth light are fit for hemp. In this case, M. du Hamel thinks, that it is best to dung the hemp-ground every year before the winter ploughing, in order that the dung may have time to rot during that season, and that the spring ploughing may afterwards mix it the more thoroughly with the earth.

In order finally to prepare the hemp-ground for receiving the seed, it should be laid as smooth and even as possible by the last ploughing.

The season for sowing hemp chiefly depends on the quality of the soil. In dry light ground, it should be sown as soon as the danger of frost, or other inclemency of the weather, is over, in the latter end of April or beginning of May, that it may get up early, and, by covering the ground, prevent the danger of drought. In wet cold grounds, it should be sown later, as the middle, or even the latter end of May.

If this plant is cultivated principally for the seed, it is probably the best way to sow it thin, in order to give it room to spread and throw out many branches, which will produce much seed; and if the plants are raised on beds or ridges, in rows, and horse-hoed, the seed will be much superior to what is obtained from broad-cast hemp. This plant may also be cultivated to great advantage, in respect of both seed and hemp, by drilling it in equidistant rows, and hand-hoeing; which will improve the land and crop, with less manure than sowing it by hand.

With respect to the seed, it is necessary to have it of the preceding year's growth, and every second or third year it should be had from a different soil. The weather, when this seed is sown, should neither be too dry nor too rainy. The best time is just after a gentle fall of rain. If the soil be deep, and in fine order, it is best to sow this seed thick,

especially if the hemp be intended for fine use, because the plants run most into height when they stand closest together, and their fibres are then by much the finer: but they should not stand so very thick as to choke one another, as this would occasion a considerable loss of plants. The usual quantity of seed is three bushels to an acre. As soon as the hemp-seed is sown, it must be carefully covered with earth, by means of the harrow, and the birds be kept from it.

The profitable culture of hemp and flax is not, however, confined to rich soils alone; for, by proper manuring, they may be made to grow well on poor sandy land. In some counties, where the land is sandy, they first sow it with barley, and the following spring manure the stubble with horse or cow-dung, and plough it under. They then sow their hemp, and harrow it in with a light harrow having short teeth. A good crop destroys all the weeds, and makes it a fine fallow for flax in the spring. As soon as the flax is pulled, they prepare the ground for wheat. Lime, marle, and the mud of ponds, form an excellent compost for hemp lands. A peculiar advantage attending the cultivation of hemp and flax is, that a crop of the former prepares the land for the latter, and therefore a crop of hemp is clear gain to the farmer. That these plants impoverish the soil, is probably a vulgar notion destitute of truth.

It is observed by Mr. Holt, that in Lancashire a crop of hemp is supposed to be an excellent means of destroying *couch*, let it be ever so abundant; and Mr. Fazakerly thinks, that this weed should always be destroyed upon the land by smothering or withering; for, if either carried off the land or even burnt upon it, the ground is injured.

Mr. Kent thinks the cultivation of hemp and flax of great national importance; and that when they are cautiously interwoven with other crops, so as not to come round above once in ten or twelve years, they do no injury to the land. It would be well, he observes, if the cultivation of them were more general in this way.

Mr. Antill's directions for the cultivation of this plant deserve attention. He observes, that whoever would raise hemp properly, and to advantage, should set aside two pieces of ground, of such dimensions each as he shall be able to cultivate every year, and sow the one while he is manuring and preparing the other for the succeeding year's crop; the higher and drier the ground the better, provided it be well dunged, and made strong and mellow. The ground should not be too sloping, lest the good soil be washed away with hard rains: if it droops toward the south, so that it may have the full influence of the sun, it will be an advantage: low, rich, warm, dry grounds will also produce good hemp; but wet land, though ever so rich, will by no means do. The ground, being prepared and made very mellow, some time in May, it being moist and in a vegetating state, but by no means wet, must be well ploughed, the furrows must be close and even, and the soil must lie light and mellow; it must then be sown very even, with two bushels of seed upon one acre. A man with an iron-tooth harrow follows the sower, and harrows in the seed, with two horses, without any balks; for, the less the ground is trampled the better. If harrowing one way be not sufficient to cover the seed, though it would be best if that could be done, it must be cross-harrowed. The ground being thus properly moist, but by no means so wet as to clod, which would ruin the crop, the seed will all start and come up together; which is a sure sign of a good crop, and nothing after that, but too much wet, will hurt it; for, hemp thus come up bids defiance to weeds and grass of every kind. Its growth is so quick, and it so effectually shades the ground, that nothing below can rise, or shew its head; and it so preserves all the moisture below, that, the hotter and drier the weather, the faster it grows. Whereas, if the seed be sown when the ground is dry, the seed that lies

SECT. XXV. *Of Flax.*

deepest, where the moisture is, will come up first, and these plants will shade and starve those that come up after; by which means the first comers will be too large, and the last will be much too small, so that the crop will be greatly damaged every way: so much depends upon this one circumstance, of sowing the seed when the ground is moist, and fit to receive it. The crop, thus rightly managed, will stand as thick as very good wheat, and be from four to six feet high, according to the strength of the ground, and the stems will not be thicker than a good wheat-straw: by this means the hemp will be finer, it will yield the greater quantity, and it may be plucked from the ground like flax, which will be a great saving. But, if it be sown thin, that is, one bushel to an acre, which is the common practice, it grows large; the hemp is harsh and coarse, and then it must be cut with hooks, which occasions great waste; for, four or five inches above the ground is left by way of stubble, which contains the best and heaviest part of the hemp. When the hemp has got its growth, and is fit to be plucked, which is known by the under leaves of the carle or male hemp turning yellow and falling off, the sooner it is pulled the better. It must then be bound up with straw bands, in single-band sheaves, rather small than large, and each sheaf must be bound in two places; and the sooner it is carried to the water to rot the better. Water-rotted hemp, if it be rightly managed, is every way better than that which is rotted on the ground; there is less waste in it, when it comes to be dressed; it looks brighter and fairer to the eye; it is esteemed to be stronger and more durable, and it always fetches a better price: besides, it is much sooner done, and it is rotted more even and alike, and with greater certainty and exactness. Hemp may be rotted in stagnated or standing water, such as ponds, pools, or broad deep ditches; and, in such water, it is generally four or five days and nights in rotting, and sometimes longer, according to the heat or coolness of the weather. It may also be rotted in running water, as in a brook or river; and, in such water, three or four days and nights are sufficient, according to the weather. To know whether the hemp is rotted enough, in either case, take a middling handful out of the middle row, and try with both your hands to snap it asunder; if it break easily, it is rotted enough; but, if it yet appear pretty strong, it is not, and must lie longer, till it breaks with ease; then it must be taken out carefully, and dried as soon as possible.

He farther observes, that what hemp is intended for seed should be sown on a piece of ground by itself, which must be made very rich and strong. It must be sown in ridges six feet wide; and the seed must be of the largest and best sort, and sown very thin, at the rate of a peck upon an acre, or rather six quarts; for, the thinner it is sown the more it branches, and the more seed it bears. It should be sown some time about the middle of April, and then the seed will not be ripe till some time after the other hemp is done with. If you have no convenient place to sow your seed-hemp by itself, then sow a border, of six feet wide, along the north and west sides of your hemp-field. The reason for sowing your seed-hemp in such narrow ridges or borders is, that when the carle or male hemp is ripe, and has shed its farina on the fimble or female hemp (by which the seed is impregnated), and the leaves of the carle hemp fall off, and the stem grows yellow, you may easily step in along the sides, and pull up the carle without hurting the female, which now begins to branch out, and looks of a deep green colour, and very flourishing; and when the seeds begin to ripen, which is known by their falling out of their sockets, you may, all along both sides, bend down the plants, and shake out the seed upon a cloth laid on the ground; for, as they ripen, they scatter upon being shaken by a hard wind, or otherwise.

THIS plant is cultivated both for its seed and the covering of its stem, the former being used for the purpose of making oil, and the latter for that of linen. The soil most suitable for the growth of this plant, is the same as that for hemp.

When pasture land is broken up in order to its being sowed with flax, it must be made very fine by repeated ploughing, before it will be in a proper state for producing a good crop.

But when the ground on which flax is to be raised has been long in tillage, it should be ploughed deep before winter, and laid up in high ridges, in order that the frosts may the more effectually moulder and loosen it. And if stiff, care should be taken not to till it in wet weather, as it will be liable to clod too much. In February, if the land be not too wet, some very rotten dung should be laid in the furrows, and immediately covered over. And in March, for southern countries, or in the beginning of April where the climate is colder, another ploughing should be given to lay the land smooth, the clods should be broken by hand, or with the spike-roller, and the seed should then be sown, and harrowed in with a light or bush-harrow, so as not to bury it above an inch deep. Wet land should be laid in beds thirty or forty feet wide, separated by deep trenches, in order to drain off the water.

Flax-seed may be sown either in the autumn or the spring; but in cases where the winter is apt to be severe, and where the flax, which is but a tender plant, is in danger of being destroyed by it, almost all the flax is sown about the end of March, or in the beginning of April.

A method of sowing flax, in order to obtain good seed, is to drill it in equidistant rows about a foot distant, and then hand-hoe it; which will keep down the weeds, and improve the crop. But it is still better to drill the rows about twenty inches asunder. For the seed, being smooth and heavy, is very proper for drilling, and in this way a very small quantity of seed sows an acre. The common allowance of seed sown broadcast is about two bushels and a half to an acre, oftener more than less; but drilled in rows at twenty inches distance, half a peck is sufficient for an acre. Flax, when sown thick, runs up in height, and produces fine soft flax; if sown thin, it does not rise so high, but spreads more, and puts forth many side branches, which produce abundance of seed; and such seed is much better filled, plump, and heavy, than the seed produced from thick sown flax. Nothing should be planted or sown between the rows, but the ground should be hoed with a hand-hoe, or small plough, taking care that none of the mould is thrown against the rows; to prevent which the intervals may be hoed with a triangular harrow, having a proper number of iron tines in it, and guided by two handles fixed behind, which make the lines go deeper or shallower at pleasure. The rows must, however, be weeded by hand. Flax cultivated in this way is shorter than common, but stronger, and not so subject to be beat down and lodged in stormy weather. There is also sufficient room to hand-weed the rows, without lying upon or treading down the flax.

In sowing broadcast, the flax and seed are said to be nearly of equal value. But by sowing in the drill method the crop of flax will not be so great, but the quality of the seed will be far superior. Flax being an article of nice cultivation, the soil should not only be frequently changed but also the seed. The quantity of seed necessary is more or less according to the views of the cultivator. If he wants the seed, he must in that case use less seed; but if he wishes to have fine soft flax, a larger quantity of seed must be employed.

Mr. Boys, in his Survey of Kent, thinks that the best tilth for this crop is a summer fallow, and next to that, a clover-lay: it is often sown after wheat and beans. The land is ploughed in

the winter, and harrowed fine in March: the seed is then sown, at the rate of two bushels and a half per acre. It is weeded by hand in the month of May, and pulled up in July; the expence of which, with turning and binding into sheaves, is 16s. per acre: the length is from two to two feet and a half; but it is of little value when of the shortest length. The produce of seed is from eight to twelve bushels; and of flax, from one to two packs of 240 pounds each, per acre. The quality of the flax of this county is like that which is imported from Holland; but somewhat inferior.

The properest time for pulling flax seems to be when its stalks begin to turn yellow, its leaves begin to fall, and when its seeds begin to have a brown colour. When pulled, it is laid together by handfuls, with the seed end turned to the south. These handfuls should neither lie quite in a line with each other, nor directly across, but a little slanting upwards, so that the air may easily pass through them. Some, instead of this method, tie the handfuls of flax loosely at the top, then spread out their roots, and thus set several of them together upright upon their roots. In either of these ways, the flax is commonly left twelve or fourteen days in the field to dry it; but this is much longer than is necessary. Linseed is reckoned good when it is of a bright brown colour, large, oily, and heavy.

SECT. XXVI. *Of Woad.*

THIS plant is grown to the greatest advantage on a light black rich soil, which has a southern situation.

Land intended for woad should be dunged a year before it is sown with this plant, and made first to bear a crop of wheat, &c. This being taken off, three deep stirrings should be given with the plough, the first in November, and the other two in the spring.

Woad is frequently sown so early as the beginning of April when the weather will permit; but when it is too cold at that period, the sowing must be deferred till the beginning of May. In this climate, however, it is often not sown until some time after this.

In some parts of Kent this plant is much cultivated. It is frequently sown on poor, stiff, and some chalky lands, in the proportion of ten or twelve pounds of seed to the acre, and among beans before the last hoeing in the beginning of July. It requires no culture while growing, except the land be foul and full of weeds; in which case the weeds must be drawn out by the hand, or cut up with a narrow hoe. At the time when the plants have produced their bloom up to the top of the stem, they are pulled up, then tied by a single stalk in small handfuls, and set up in a conical form to ripen. When thoroughly dry, the seed is shaken out on a cloth or into a tub, the plants being then bound with rope-yarn into bundles, each weighing thirty pounds. Sixty of these bundles make a load of woad, the price of which is generally from 4l. to 10l. It is chiefly used by the dyers, and the Keynsham growers are said to cultivate and prepare it in the best manner.

SECT. XXVII. *Of Madder.*

THIS is a plant also used by the dyers, which was formerly much cultivated in the eastern part of Kent. I am firmly persuaded, says Mr. Boys, that good crops of excellent madder may be raised in Kent, on soils properly adapted for the purpose; and that it would be a profitable article of culture, if it were never under 3l. per cwt. nor would the buyers be injured by a restriction to this price; but then the legislature must interfere to prevent the importation of the root from Holland, where it can be cultivated cheaper than here. Perhaps, if that country should continue unfriendly to us, it might be good policy to encourage the growth of madder at home. I have ma-

ny years, says he, been in the habit of cultivating it; but, from the low price at market, have been obliged to abandon it. There have been several modes of planting practised; but that which appears to him the best, is to plant it in single rows, about two feet apart. The land should be perfectly clean from weeds, and have been well manured the preceeding year, so that the dung may be well incorporated with the soil; which should be a fine deep, rich, sandy loam, without any redundancy of moisture. In order to prepare the land for planting, it should be ploughed in the autumn, to have the benefit of the winter's frost, and harrowed in dry weather in the spring, and then kept clean by horse-hoeing, until the plants are ready for drawing, which is usually by the end of May, or beginning of June: the proper time is known by the plants having got to the height of ten or twelve inches from the ground, and having produced roots branching out from the bottom of the suckers; which will be perceived by drawing up a few of them. When the suckers are in this state, all hands necessary for this work are to be provided, that the operation may proceed with every possible dispatch. One acre requires about twenty thousand plants. The plants should have about a third of their tops cut off, and then their roots should be dipped in earth, or fine mould and water beaten together to the consistence of batter; which prevents the necessity of watering them. It requires one woman to dip the plants, two others to carry and strew them in handfuls along the furrow, and about seven to follow the plough. The land should be ploughed, with a strong turnwrest plough with six horses, twelve or fourteen inches deep: women attend to lay the plants about eight or nine inches apart in every other furrow, leaning off from the plough; by which, every time the plough returns, the row of plants laid in by women who follow the plough, is covered with the earth of the furrow. The crop must be kept perfectly clean by the hoe and hand-weeding during the summer months, and earthed up with a plough each autumn until the third after planting, when the roots are dug up by trenching the land two feet deep; two children attending each digger, in order to pick out the roots.

The most proper time to take up the roots is when they are about the size of a swan's quill; they then yield most dye, and are of course most proper for use: but the time when they arrive at this proper state depends not only on the nature of the soil in which they have been planted, but also on the good husbandry that has been bestowed on the land.

SECT. XXVIII. *Of Hops.*

THE land most suitable for the cultivation of hops is that which has a rich, deep, mellow, dry soil, rather inclining to sand than clay, and the situation of which inclines to the south.

In the Agricultural Survey of Kent, it is observed, that when a piece of land is intended to be planted, the first thing is to plough the land as deep as possible, early in October, and to harrow it level: it should then be meted each way, with a four rod chain, placing pieces of reed or stick at every tenth link, to mark the place of the hills; which makes 1000 per acre. This is the general method; but some few grounds are planted eight, and some twelve hundred per acre; some are planted wider one way than the other, in order to admit ploughing between the hills instead of digging: but this practice, although it has been tried many years, does not seem to increase, on account of the difficulty of digging along the rows where the plough cannot go: that part, being much trodden with the horses in ploughing, digs so much the worse, that an extra expence is incurred, which in some measure defeats the economy of the plan. When the hills are marked out, holes are dug about the size of a gallon, which are filled with fine mould, and the nursery-plants placed in them. Some put three plants, others two, and some only

one good one to each hole. If the land be planted with cuttings instead of nursery-plants, the holes are dug in the spring, as soon as cutting-time commences; some fine mould is provided to fill up the holes, in which are placed four or five cuttings, each about three or four inches in length: they are covered about an inch deep with fine mould, and pressed down close with the hand. When the land is planted with cuttings, no sticks are required; but if nursery-plants are used, they require sticks or small poles, six or seven feet high, the first year: in both cases, the land is kept clean during the summer, by horse and hand-hoeing; the next winter dug with a spade; and early in the spring the old binds are cut off smooth, about an inch below the surface; a little fine mould is then drawn over the crown of the hills. As soon as the young shoots appear, so that the hills may be seen, they are stuck with small poles, from seven to ten feet long, in proportion to the length it is expected the bind will run: these poles are called seconds, and are generally bought in the woods, at from 5s. to 8s. per hundred, and three of them are placed to each hill. As soon as the bind gets about two feet in length, women are employed to tie them to the poles. The land is kept clean during the summer, by horse and hand-hoeing, as before mentioned. The proper time for gathering them is known by the hop rubbing freely to pieces, and the seed beginning to turn brown. They are picked in baskets containing five bushels each, and are carried to the oast in bags, at noon and evening, for drying. Great care and skill are necessary in this branch of the business; the smallest neglect or ignorance in the management of the fires will spoil the hops, and occasion great loss to the planter. When dried and sufficiently cool to get a little tough, so as not to crumble to powder, they are put into bags or pockets; the former containing two hundred weight and a half, and the latter an hundred and a quarter: they are then trodden very close, and the excise-man weighs them.

But the second year after planting, full-sized poles from fifteen to twenty feet in length, according to the strength of the land, which cost from 16s. to 36s. per hundred, are placed to the hills instead of the seconds, which are removed to younger grounds. Here great care is necessary not to overpole; for by that means young grounds are often much weakened; and it is equally necessary not to overdung them, as that will make them mouldy. About fifty cart-loads of well rotted farm-yard dung and mould, once in three years, are generally considered as sufficient for one acre of land.

Some think that a good season for planting hops is from the beginning of March to near the middle of April, the time when they begin to shoot; but in Kent, October is preferred.

SECT. XXIX. *Of Reaping different Kinds of Crops.*

THIS is performed in different ways in different counties, but chiefly either by the sickle or the scythe.

Wheat when weedy should be cut some days sooner than common, that the weeds may have time to wither before the corn become too ripe: for if it be not cut till the grains are full ripe, it will be liable to considerable damage by shedding, loss of colour, and injuries from rain, whilst it remains exposed for the purpose of drying the weeds. A day's gentle rain, or even a single shower, can do much harm: all possible care should therefore be taken to guard against its being much wetted.

Although corn be sometimes bettered by lying a little in *swarth* or *grips*, to take the dews, which contribute to render its grain plump and of a good colour; in hot dry summers, when the corn ripens fully, and its own vigour gives a proper colour and plumpness to the grain, so that the husks readily yield their contents when threshed, wheat need not lie out in grip, before it is sheaved, or in sheaf, unless very full of grass and weeds. When the harvest is wet, small sheaves are best, be-

cause, thin at top, and falling close, the rain does not sink down into the middle of them, and so go through into the bands, as it is apt to do in great sheaves, which lie broader, and take a larger compass. Small sheaves are also best when many weeds are intermixed with the corn; because the air, wind, and sun, have then a greater power to dry them, than they could have if the sheaves were of a large size.

For every purpose, and in whatever way corn has been cut, Dr. Anderson is decidedly of opinion, that it should be bound up into sheaves before it is led, if economy be aimed at, and that the neater these sheaves are done up the better: for, says he, the expediting the loading and unloading, and the saving the waste that would accrue by shaking, and while carrying it about loose in forking, will always do much more than pay for the expence of binding it up, even where the corn has been cut down by the scythe; a slovenly practice, which he says cannot be advisable in any case.

In his Minutes of Agriculture, Mr. Marshall recommends the tying of sheaves but loosely, and not too large: but the extreme must be guarded against; for if they be tied too closely there is danger of their slipping wholly out of their bands; besides their being difficult to load, and worse to stack. He recommends also that they be set up in such a manner, as but just to touch each other at the butts and ears: leaving a space of a foot and a half between each sheaf at the band-place, and that the ears of the bands be turned inward. He observes in general, that the small loose-tied sheaves will dry soon, while the large tight-tied ones, of the same shock, will grow; and that the ears of the bands are the first that will grow; and that those shocks which stand free and open are far better than those of which the sheaves stand huddled together in a close lump, through which neither air nor sun can penetrate. Instead of tying the band at the foot of the butts, he recommends the tying them loosely about the same distance from the tips, and spreading the butts, setting the sheaves up singly in resemblance of sugar-loaves, leaving the insides totally hollow; this will enable them to dry very soon; and then shifting the bands the next day back again to the common banding-places, and opening the ears, they will soon be perfectly dry.

Both in Oxfordshire and several other counties they bind up their wheat in sheaves, though it be full of weeds, and set three sheaves somewhat sloping against three others; after which they cover their tops with two sheaves opened at their ear-ends, which are extended and placed downward. In this situation they let their wheat stand some time in the field before they carry it in.

In forming what they call *wheat pooks* in Wiltshire, the sheaves are set in a circle, with their ears uppermost; another circle of sheaves is placed upon that, and so on, contracting each round, till the pile ends in a point, upon which a sheaf, opened and turned with the ears downward, is placed, like the hackle of a hive. A load or two may thus be put into a pook; which is a good way to secure corn against rain, and to give the weeds among it time to dry.

In Lancashire, though the grain has been generally reaped, some farmers have lately mown their crops of corn. The following is Mr. Harper's method: The wheat is mown *in*, that is, thrown towards the standing corn, immediately gathered and tied up into sheaves: the set consists of two mowers, two women gatherers, and one man binder. The barley and oats are mown *out*, into swathes, and gathered at convenience. The advantages of this method are, a saving of expence about 14d. per acre, less danger of the corn being shook out of the ear, and gaining nearly one-third more straw; no trifling consideration under several heads, especially since it does not appear that what stubble is left in the field is of the least service, but in some instances evidently does harm, as to clover or other young grasses, by retaining moisture through the winter, and starving the ten-

der plants, or injuring the hay when mown, which, when wet, it has a tendency to render putrid. After the corn is gathered, the ground is gone over with a rake, to collect what straggling ears may remain, which are generally the heaviest, and of superior quality. This is done by a *wooden rake*, with teeth about one inch longer than the common hay-rake, which is preferred to the *drag-rake*, and does its work much neater: a woman can rake about two statute acres per day. The scythe for cutting the corn has an addition of a bow, made out of a piece of rod-iron, fastened into the pole, and extending three inches over the scythe heel, from whence it rises about nine inches in height and about two feet in length, and which forms a kind of cradle. This rod is supported by an upright prop from the pole about the centre, and which is further braced and kept tight by a string.

The method of setting up corn in that county, after being reaped, and while it continues in the field, is this: If barley or oats, and in a greenish state, they are set up in four standard sheaves only, with one cover called a *booder*; that is, a large well-bound sheaf is selected and opened, with which the four standard sheaves, with the grain uppermost, are covered, the grain of the booder hanging downwards, but free from the ground. This shape is provincially called a *pricket*. The most general method, however, is six sheaves standards placed against each other, spread out in their butt ends, and closed tight at their tops; when a couple of sheaves are opened, each about one-half, clapped over each end of the standards, and meet with their butt ends together in the centre; thus forming a roof or cover for the standards. This form is provincially called *bat-task*, and the cover a *rider*.

In Scotland, Mr. Robertson says, wheat is generally cut with the sickle, and bound into sheaves, and *stooked* in 12 *sheaf stooks* immediately thereafter; but in some cases, particularly in damp weather, it is left *broad-band*, or untied for two or three days, to accelerate the *winning*; and sometimes *gaited*, or tied slack and set on end sheaf by sheaf, for the same reason. In a few cases, however, barley is cut with the scythe, and collected into sheaves with a reaping fork; in which mode of operation one girl forms the sheaves, another makes the bands, while two men cut and one binds; in all five people to two Scotch acres in the day. In the more common method by *shearing* with the sickle, nine people are required to do the same work; but of these eight may be women; one man only for binding being necessary; while the other way takes three men at least, which in the general scarcity of men-labourers in harvest is not practicable to a great extent. Barley is the most difficult of all grain to *win*, requiring generally three weeks standing in the stook before it is fit to be put into the stack, and where, after all, it is more liable to be heated, or *more-burnt*, than any other grain; which renders it sometimes proper to form a funnel up the heart of the stack to keep it cool.

Both the broadcast and drill-bean crops are here also laid down loose from the sickle, where they remain eight or ten days (more or less as the weather may be), to *win* before they are bound up. They are sometimes bound with straw ropes, and sometimes with ropes of pea straw.

SECT. XXX. Of Stacking Grain.

In order to preserve corn in the straw, it is very common to make it up into stacks. When this is done, it is necessary to make a kind of ground-work, for the grain to rest upon pieces of wood laid across each other, or to put posts into the ground for the same purpose. In Hampshire and other counties, where they have plenty of stone, they make their supporters of them, which is probably the best way.

Mr. Marshall thinks, that a square is the best form of a stack-frame at bottom, as being more pleasing to the eye, tak-

ing less thatch, and standing firmer than any other. The stem, he says, should be carried up as plumb as possible, except in the last course, which should project five or six inches, to form the eaves; for the weight of the roof will press out the upper part of the stem sufficiently. If it over-hang in making, its own weight and the weight of the roof will squeeze it too flat. The stem must contain about two-thirds, and the roof one-third, of the whole stack. If built on a frame, the stem may contain less, and the roof more; but if on a bottom, the contrary. And the corners of the stem should not be made too sharp. The ends of the roof should have a gentle projection, answerable to the stem; and the sides should be carried up rather convex than flat or concave. Perhaps a roof which is gently convex shoots off the rains preferably to any other. Corn-stacks should not be made too large, as the risk of making and getting-in is much less on small than on large stacks: Besides, large stacks do not settle so true as small ones, and consequently do not stand the weather so well.

Doctor Anderson is however clearly of opinion, that the farmer would derive considerable advantages from putting up all his corns under permanent roofs, which, he says, might be constructed at little expence, without having any walls, by means of posts placed perpendicularly on each side and across the building, at the distance of six feet from each other, and then putting a roof upon them.

Now, says he, supposing the corn to be in sheaves, begin to build it up in the corn shade by laying a row of sheaves, with the butt-ends outwards, right across the shade, in a line with one of the rows of posts; and another row of sheaves in the same manner, in a line with the next row of posts, laying the tops of the sheaves towards each other. These ought to be laid in by hand loosely, from a scaffold on each side, and not trod upon. The points of some of the sheaves will reach to the butts of the others, and they will pack thus quite well. A row of sheaves is then to be laid across these, so as that the length of the sheaf may lie *across* the building. The butts of the sheaves of this row should be placed first on the outside, and then another row of sheaves should be placed in the same direction, overlapping the points of the former, and so far from the side as that the middle of the sheaves shall be opposite to the first post; and on the other side of it another row reversed, so as that the points of the one sheaf shall lie towards, and intermix with, the points of the others, and so on across the whole building, in rows, with the butt ends of one row of sheaves to the butt ends of another, leaving a small space between them for the circulation of the air. Above these should be laid another stratum of sheaves across these in the same direction as the first, and so on, crossing each other in alternate layers, the whole way to the top.

One division, of six feet in width, being thus finished, another is to be begun and finished in the same manner, leaving one of the intervals of six feet between the posts free across the whole, and the other filled up alternately throughout the whole. In this way the work is to go on from day to day as the harvest advances. The corn being thus secured, immediately as it is cut, from the possibility of receiving damage from bad weather, and being placed high in the open air in narrow divisions, full of perforations, what sap is in it will be gently evaporated, while the native juices of the plant will be preserved without the danger of heating.

The sheaves being put up loosely, the stack will gradually subside a good deal in consequence of the pressure from above. And as it will be fit in most cases to be packed more closely after a few days, by the time that the whole range of shades are thus filled, and room wanted for more corn to be put into it, the sheaves that are upon the top of the first division, and which are now of course the driest, ought to be thrown down into the first open division, and regularly laid and trampled upon, so as

to make them firm ; until, by lowering the one division and raising the other, they come to be of an equal height ; when the operators should proceed to another, and so on gradually to others as they are wanted.

The under part of the shade will now be filled close up, and the top be left quite open as at first, so as to admit of a similar operation with the former, the first led corn forming now the base, and so on. The latter cut corn may now be put upon the top of it, exactly after the same manner with the first ; and being high in the air, and not so much pressed by the weight above, it will be more quickly dried. In this way you are to proceed, making two or three successive rows, if necessary, until the harvest be finished and all got in.

But for wheat, which is much firmer in the straw than other corn, and generally cleaner and well ripened, less precaution is necessary. The first division may be put up as above described, but it will not be necessary to leave any open divisions for this kind of corn : one division after another can be filled up from the scaffold at the side. In most cases, no precaution will be wanted to prevent it from heating ; but when it is greener cut than usual, and it appears doubtful if it will keep well, in laying the sheaves lengthways across the shade, an opening of a few inches in width may be left in the middle between two sheaves, all along in the same line right across the whole, which being covered by the sheaves laid lengthwise across it, will admit a circulation of air : one of these pipes may be made in every second, fourth, or sixth layer, as circumstances may require.

In this way the Doctor thinks that the whole corn of a farm might be perfectly secured against sustaining any damage from the weather in any season ; and thus a considerable expence on some occasions, and amazing waste in others, be entirely prevented ; while the straw in every case would be nearly as good as hay, and the quality of the grain much better than it ever can be, if subjected to rain after it has been reaped. For, says he, I have found by experiment, that if grain has ever been wetted from the time it is cut down, it never can be brought to the same state of perfection as it would have had if it had never been wetted : nor can any art ever make the same corn, if it has been once wetted, shrink into so small a bulk, or become of course so weighty, as the same corn would have been if it had been thoroughly *swinn*, without having been at all wetted. Nor does barley that has been wetted and afterwards dried, ever malt so kindly as it would have done if kept quite dry. This last is probably a fact not very generally known.

SECT. XXXI. Of Making Hay.

WHEN grass is to be made into hay, the farmer should be directed in the season for mowing by its quality. If the crop be very great, it should, however, be cut as soon as the bottom of the grass grows yellow : and in other cases, where nothing prevents, it should generally be when the grass is in full bloom before the stalks begin to harden. But there is not any general rule for this, as in some cases the ripe seeds add a great value to the hay, as in sainfoin and burnet : and in others, the growth of the grass itself is of advantage, as in some kinds of meadow-grass. The process of making hay differs in some respects according to the nature of the grass. But in general, if the weather be quite fine, the grass may be spread out as fast as it is cut down, especially if it lie so thick in the sward that neither the air nor sun can pass freely through it : but if wet be feared, it should remain in the sward. At night, make it into grass cocks ; and the next day, as soon as the dew is off the ground, spread it again and turn it, that it may wither on the other side ; then handle it, and, if it be found dry, make it up into large cocks. Should the weather continue favourable during the second day, the grass will, by that time, be so dry

as to bear being kept in these cocks till the day on which it is to be carted ; when it should be spread out again in the morning, to receive a farther drying, if necessary. If the cocks be made as tall and taper as is consistent with their standing safely, the winds, by passing through them, will dry them gently and equally ; and though rain should fall upon them, it will not do much hurt, because the greatest part of it will run off directly, and the sun and wind will soon dry that which may have penetrated into the cocks. When made in this way, they have a great advantage over the common small and low cocks : for if a rainy season comes on, these last will be so thoroughly wetted, that the wind will not be able to penetrate sufficiently to dry them.

Where the colour of hay is particularly regarded, the best way of making it, if the weather be fair, is to open it perfectly and spread it thin, immediately after it is cut, and to have hands sufficient to turn and shake it, till the evening, when it should be made up into grass cocks. This method should be pursued every day till it is sufficiently made.

In Staffordshire, Mr. Pitt says, the seasoning or making of clover and rye grass into hay is as follows : After mowing, the swathes are suffered to remain till they are well dried on the upper side ; they are then turned over, and the other side dried in like manner, and afterwards turned a second time if necessary ; they are then got together, raked, and carried to the stack : the stalks of clover take a good deal of time to dry thoroughly ; the time for which is facilitated, as well as the effectual making of it secured, by sunshine and fair weather ; and it is supposed to save itself best in the swathe unbroken.

In Lancashire, Mr. Holt says, that Mr. Eccleston's mode is to collect the clover together into small sheaves, which are kept straight ; then twisted together in the top part, to admit the sheaf to stand upon its butt or bottom-end, when spread out, in the same manner that horse-beans have been frequently treated. If these little bundles, says he, be not thrown down by the winds, they will resist more rain, if it should fall, than when lying on the surface of the ground ; and if the weather be fine, having more surface exposed and open, the clover will cure the faster. Clover for hay requires to be made more dry than grass ; for, if the sap is not thoroughly dried up, it often heats too much, and is spoiled. Sainfoin also requires to be well dried, but not quite so much as clover ; they neither of them are apt to fire in a stack ; but frequently, if carried too green, will burn to a coal.

Mr. Robertson, in the Agricultural Survey of Mid Lothian, observes, that " when hay from seeds, such as clover and rye-grass, is cut down, there are two things respecting it to be considered. 1. The *swath* is laid in pretty regular order, in form somewhat like to the blade of a razor, in which the ears incline to the *edge*, while the bottoms are piled up one above another, in the opposite direction, at the *back*. 2. The stalks, individually, are firm and straight, and like to reeds ; naturally unsusceptible of moisture, but very readily admitting a passage through them to the air, or the wind, as it blows over the field. In consequence of these two circumstances, hay, in this situation, is not difficult to be win or *made* ; for in dry weather the air readily penetrates through it, and dries it quickly ; and in wet weather it is not apt to imbibe the rain, but rather sheds it off along its upper tire of stalks, and of course can stand a considerable deal of rain without receiving much damage, and very readily becomes again dry on the return of fair weather ; a fact well confirmed by experience ; while, at the same time, its aromatic flavour, as well as natural colour, is very little exhausted or altered, as there is but a small proportion of its bulk exposed to the weather, the greater part remaining sheltered as under a shade, and dries by degrees. But should the hay-makers, in the view of accelerating the process, *turn* it in the

swath, the following circumstances will occur: 1. The swath, instead of presenting a regular inclined surface, naturally adapted to lead the rain off as it falls, will lie expanded, loose and irregular; well adapted indeed to receive the influence of the winds, or of the rays of the sun, in dry weather, but equally ready to catch rain in case of a shower. 2. The hay itself will have become so much bruised, or softened, in the operation, as to retain, and even imbibe, that moisture which in the former case it would have repelled or shed off. The consequence must be (as it is known to be in fact), that hay, in this situation, if once it gets wet, is much more difficult to be got dry again, than if it had not been turned at all.

"There are, however, cases which frequently occur, in which it is proper to turn hay. Thus, if it has received rain, or has been protracted in the making by a long continuance of damp weather, it must be turned in the swath at all hazards; and in most cases it will be proper to turn it in the forenoon of the same day in which it is meant to be put into large ricks in the afternoon: but, in general, the process cannot be greatly advanced by that operation in good weather; and as it really retards it, if followed by wet, the best way is to let it alone till it is finally to be made, which in dry weather will be in about three days after it is cut; when it may be put into ricks of from 40 to 80 stone weight, where it may remain ten or twelve days longer, by which time it will be fit to be put into *rows*, or *stacks*, of any dimensions. There is, however, one fact to be admitted, that in this mode of hay-making the upper side of the swath (exposed perhaps for three days together to the weather) may be *too much win*, while the under side, for want of exposure, may be *too little*. There is, however, another fact equally well ascertained, that by the time the hay is in the rick for 24 hours, the whole becomes one homogeneous mass of the same degree of temperament; that which was too dry imbibing the superfluous moisture of that which was scarce dry enough, so that no distinction can afterwards be observed."

In respect to the making of hay from meadow grass, Mr. Pitt observes, the first operation after mowing, is spreading it all over the meadow, which is called *tedding*; it is then raked into win-rows, and the win-rows farther divided into small cocks, called *grass cocks*: next morning, if fair weather, the grass cocks are cast about into square beds, and the vacant spaces between the beds, if any, raked clean: the beds, after turning, are then put into middle-sized cocks, called quarter cocks; next morning, if fair, the quarter cocks are again spread open, if necessary, and turned over; and then put into large cocks: it is then fit for carrying to the stack. The time for these operations, as well as their effect, is much facilitated and improved, as before remarked, by sunshine and fair weather. But in showery or casualty weather, he thinks the following process is superior: After mowing, and the swathes being somewhat seasoned, rake them clean over: when the other side is seasoned, make them into small cocks: when the cocks are dry on the upper side turn them over, and when dried on the other side, half a dozen of them may be put together into quarter cocks, and so by degrees into large cocks: this process will require more time than the former, but will keep the hay much better protected from the weather. The injury hay sustains from rain is when it is spread all over the ground, in which case if the rain continues the hay will lose its juices and its colour; whereas, if hay be in cock, with the ground bare between the cocks, it will sustain a deal of rain without injury. In the last described process the hay-making will be much facilitated by due attention to hours of sunshine, and by then spreading about the cocks a few at a time, or as many as the continuance of the good weather will permit, getting them up again hastily upon the approach of rain: he believes, that by diligence and due attention to this last process, hay may be preserved from sustain-

ing much damage in almost any season. All the above operations should be performed when the hay is dry.

Mr. Robertson also remarks, that in the making of *natural*, or meadow hay, there are circumstances which make a different and more expensive mode of operation necessary. "In this case the swath is far from being laid down in a regular form, while the hay itself is neither firm nor straight; but, on the contrary, very soft and much interwarpt together, and generally so thick at the bottom, that, when turned up by the scythe, it lies so compact and close, as totally to exclude the external air: therefore it becomes necessary, not merely to *turn* this kind of hay from time to time, but to *ted* it very minutely, spreading it like a blanket, as evenly as possible, over the whole surface of the ground, so that no part of it may be much excluded from the influence of the drying winds, or rays of the sun. In this way, when the weather is good, natural hay may be made, in the course of a week, ready to be put into cocks of 20 or 25 stone weight; where it ought to remain, well tied down, and neatly dressed in the sides and at the bottom, for eight days more; when it may safely be collected into larger ricks, and finally into *rows* of greater dimension. In wet weather, this process is no doubt protracted to a longer period; but still it will be found, that to spread it as thinly over the field as the ground will admit of, will be the surest way to preserve it from material injury; for although, in this case, it is exposed to every shower that falls, yet as it is not any where of much thickness, the water is not retained, but sinks through it to the ground; and on the return of the first breeze, in a few hours the upper parts will be dry; and if then turned, the under side in like manner will receive the same benefit."

SECT. XXXII. Of Stacking Hay.

On this subject Mr. Pitt observes, that some people carry tunnels up their hay ricks, either by drawing up a binding of wheat straw, or by actual tunnels of wood: these are meant to discharge a part of the vapour generated in fermentation, and thus prevent any danger of the hay firing: those who practise it remark, that they can carry their hay a day or two the sooner. But Mr. Pitt and many other farmers never use any such precaution; nor is it necessary, says he, if the hay be sufficiently made, and put together in stacks not too wide at bottom. He thinks that a bottom four yards wide at beginning is enough, if the sides be a little sloped outwards, and the stack carried to a sufficient height. The propriety of discharging any part of the vapour arising by fermentation from hay-stacks has been questioned by some, who think it should be smothered and retained in the hay as much as possible, and that no other precaution is necessary than due attention to the hay-making.

Mr. Holt remarks, that in Lancashire Mr. Eccleston cuts gutters in the ground, lengthways, and covers them across in that place whereon a stack of hay is to be built. Through these trenches, in different directions, the outward air may enter, pass through, then ascend the aperture left in the stack; and this continued circulation takes away the generated heat or foul air, which, if confined together without any vent, might produce damage to the hay, or worse effects; and by these useful precautions he is enabled to collect his hay together at a more early period, and in a more juicy state; by which good practice, time is saved, and the quality of the hay rendered better. He has also observed stacks of clover hay made with layers of wheat straw at certain distances from the bottom to the top; which he thinks a good method, particularly when it has had bad weather upon it, and was got in rather damp, as the damp heat is conveyed through it by means of the straw from one side to the other, and a greater circulation of air might still be procured by a chimney in the centre being filled with straw. Hay-barns have of late been erected in many places, standing upon

pillars, and covered with slates; sometimes with a bottom boarded with planks, open in the joints, perforated with holes, and lying hollow a space above ground, to admit a free circulation of air all under the hay. These buildings are useful, cheap, and by their great convenience in bad weather, and the great preservation they afford to the hay, soon repay the expenses which are at first incurred. It is a good practice with hay in buildings, as soon as it is become solid enough to bear the knife, to cut a passage round the walls, about half a yard in breadth. The hay which comes from the passage thus cut, may be put on the top of the mow: by this method, a free circulation of air is obtained, and the tainted smell which is contracted by the hay which lies up to the walls through the winter, is by this method prevented or removed.

Large stacks being apt to heat more than small ones, it is necessary to carry the hay, of whatever kind, so much the drier; and if proper attention is paid, and the weather will admit a large quantity being carried together perfectly dry, there is no occasion for any chimneys being made; but when, from apprehensions of approaching bad weather, it is hurried in too soon, then chimneys made, by drawing up the stack, as it ascends, a basket or a sack stuffed with hay, will certainly prevent any danger of heating.

It is however recommended by Doctor Anderson, as by far the most beneficial practice, for farmers to stack their hay under permanent roofs. By this means there will be less danger of the hay being wet before it is carried.

SECT. XXXIII. Of Fruits.

In many counties the growth of fruit, for the purpose of making liquor from its juice, constitutes a very profitable part of husbandry; it is therefore necessary to consider the methods by which it may be most advantageously cultivated. The fruits chiefly cultivated with this view are, the *Apple*, the *Pear*, and the *Cherry*.

Of Apples. Nature seems to have furnished but one kind of this species of fruit, the *Pyrus malus*, or crab. The great variety of sorts cultivated by those who are engaged in this part of husbandry, are evidently not natural species.

Those, therefore, who are anxious for the improvement of this fruit, should endeavour to procure the best accidental varieties, and, after improving them as much as possible by cultivation, to preserve them in that state by artificial means of propagation. But even this method is limited, for art can only prevail for a time. Thus, most of the old fruits, as the *Red Streak*, the *Stire Apple*, and the *Squash Pear*, are either lost, or very much on the decline.

In raising this fruit, Mr. Marshall observes, that the seed-bed should be adapted to the intention of the planter. Where new varieties of fruit, or the improvement of old ones, is the object, the seed-bed should be made as rich as possible: But on the contrary, where the preservation of varieties is all that is wanted, an ordinary loamy soil is sufficient. In either case, it is proper that it should be perfectly clean, from root weeds at least, and that it should be double dug from a foot to eighteen inches deep. The surface being levelled and raked fine, the seeds are to be scattered on, about an inch asunder, and covered about half an inch deep with some of the finest of the mould previously raked off the bed for that purpose. During summer the young plants should be kept perfectly free from weeds, and the ensuing winter may be taken up for the purpose of transplanting; or they may remain in the seed-bed until the second winter, if not crowded.

And the nursery-ground, like the seed-bed, should be enriched agreeably to the general intention; and should, in common good management, be double dug at least fourteen inches deep, but eighteen or twenty is always preferable. The seedling plants should be sorted, according to the strength of their

roots, that they may rise evenly together. The tap or downward roots should be taken off, and in this operation the longer side rootlets should be shortened. They should then be planted in rows, three feet apart, and from fifteen to eighteen inches asunder in the rows; care being had not to cramp the roots, but to bed them evenly and horizontally among the mould. If the plants be intended merely for stocks to be grafted, they may remain in this situation until they be large enough to be finally planted out. But it is probably a better way to retransplant them into fresh, unmanured, well-dug ground, two years before they are transferred to the orchard or field, and place them together that they may form regular globular roots. In raising or improving varieties, however, the nursery-ground should be naturally deep, well soiled, and highly manured. The plants must also be repeatedly moved at every second, third, or fourth year, that they may grow strong and vigorous by the addition of fresh earth. In pruning the plants, the *leader* should be particularly attended to. If it shoot double, the weaker of the contending branches should be taken off. If the leader be lost, and not easily recoverable, the plant should be cut down to within a hand's breadth of the soil, and a fresh stem trained. The stem boughs also require attention. The undermost of them should be gradually taken off by going over the plants every winter; always, however, cautiously preserving sufficient heads to draw up the sap. A good stem should be pretty tall and well proportioned.

In propagating and improving the varieties of this fruit by cultivation, care should be taken to collect the seeds from those which have the best flavour; and when these have arrived at a proper state in the seed-bed, choose from among them such plants as have the most apple-like appearance. Transplant these into a rich deep soil, in a proper situation, letting them remain until they begin to bear. With the seeds of the fairest, richest, and best-flavoured fruit repeat this process; and, at the same time, or in due season, engraft the wood which produced this fruit, on that of the richest, sweetest, best flavoured apple; repeating this operation, and transferring the subject under improvement from one tree and sort to another, as richness, flavour or firmness may require, until the desired fruit be obtained.

In the planting of fruit-trees, different distances are preferred by different planters. In the grass grounds of Gloucestershire, and the arable fields of Herefordshire, twenty yards is a common distance; but twenty-two yards is probably the best distance. In grounds, the trees should be planted in cross-lines for the convenience of ploughing; but in orchards, it is better to set them in the *quincunx* manner, that they may have room to spread on every side.

The following are the directions which Mr. Marshall gives for planting, and which he considers as most likely to succeed. The grounds being set out with stakes driven in the centres of the intended holes, describe a circle, five or six feet in diameter, round each stake. If the ground be in a state of grass, remove the sward in shallow spits, placing the sods on one side of the hole. The best of the loose mould place by itself on another side; and the dead earth, from the bottom of the hole, in a third heap. The depth of the holes should be regulated by the nature of the subsoil. Where this is cold and retentive, the holes should not be made much deeper than the cultivated soil. To go lower is to form a receptacle for water, which, by standing among the roots, is very injurious to the plants. On the contrary, in a dry, light soil, the holes should be made considerably deeper; as well to obtain a degree of coolness and moisture, as to be able to establish the plants firmly in the soil. In soils of a middle quality, the hole should be of such a depth, that, when the sods are thrown to the bottom of it, the plant will stand at the same depth in the orchard as it did in the nur-

fery. Each hole, therefore, should be of a depth adapted to the particular root which is to be planted in it. The holes, however, ought, for various reasons, to be made previous to the day of planting. If the season of planting be spring, and the ground and the weather be dry, the holes should be watered, the evening before the day of planting, by throwing two or three pailfuls of water into each: a new, but an eligible practice. In planting, the sods should be thrown to the bottom of the hole, chopt with the spade, and covered with some of the finest of the mould. If the hole be so deep that, with this advantage, the bottom will not be raised high enough for the given plant, some of the worst of the mould should be returned before the sods be thrown down. The bottom of the hole being raised to a proper height and adjusted, the lowest tire of roots are to be spread upon it; drawing them out horizontally, and carefully spreading them in different directions, and pressing them evenly into the soil; covering them, by hand, with some of the finest of the mould; one person steadying the plant, another adjusting and bedding the roots, and a third supplying the mould; which being raised high enough to receive another root, or another tire of roots, they are to be spread out horizontally upon it, and bedded in a similar manner: thus continuing, until every root be bedded, separately, horizontally (or somewhat declining), freely, yet firmly, among the best of the soil; great care being had to work the mould well in, by hand, among the roots beneath the crown, that no hollows nor false filling may be left: to prevent which, the mould, after the roots are all bedded, and covered some depth, should be pressed or trodden hard (according to the nature of the soil and the state of the season) with the foot; the remainder of the mould being raised into a hillock round the stem, for the triple use of affording coolness, moisture and stability to the plant. In forming these hillocks some skill is requisite. The soil ought not to press against the stem much higher in this situation than it did in the nursery: yet it is proper that there should be a descent for rain water, from the stem; not toward it. To this end a dimple or little dish should be made on the top of the hillock; and, from the rim of this, the slope should be gentle to the circumference of the hole; where the broken ground should sink some few inches below the level of the field."

In the Transactions of the Bath and West of England Society, Mr. Morfe recommends the raising of young apple stocks, from the kernels remaining after apples have been squeezed for cyder, in this manner:

Prepare, says he, a piece of ground by well digging and clearing from weeds, keeping the surface smooth; and in February or March lay the *must* thereon, and shovel-turn it in, that it may be two inches deep: in about six weeks the young plants will appear, and must be kept clean from weeds: let them remain two or three years in the seed-beds, when they should be taken up, and the tap-root cut off, as also some of the spreading branches. There now should be another piece of ground prepared by double digging, wherein to transplant the stocks, laid out in beds four feet wide: plant them in rows across the beds about one foot distance between the rows, and eight or ten inches distance in the rows: let them stand here three years, when they must again be taken up, the roots and tops dressed, and planted in rows about eighteen inches distance in the rows, and three feet between the rows; but four feet is better, as it will leave more room to dig the ground between them, which should be done at least once a year, and kept clean from weeds, &c. by hoeing. Transplanting them twice, and pruning their roots, makes them root better and stronger, and commonly rise with a wig or fibery root. They are to stand in this nursery until of sufficient size to plant in orchards: some may be large enough when ten years old, others not until fourteen or fifteen; for they may be of very different sizes, although

sown and planted at the same time. Here they are to be carefully trained up straight, and pruned every year, by cutting off five or six of the largest knots or sprays each year, and not many more in one year, as it would make the stock grow top heavy and throw out more branches. This pruning should be done in the spring season, as the wounds will heal soonest when the sap is rising; but if pruned in autumn or winter, the wounds will be long in healing, and be very black, and continue so for years. The stocks ought to be strong for planting orchards, that they may the sooner grow out of the way of cattle, which very often do them great injury. The size he chooses to plant is from one inch and a quarter to one inch and a half in diameter at the grafting-place; that is, about five feet six inches from the ground. And the method he pursues in planting orchards is, first to lay out the field by setting up stakes equidistant, 20 or 22 yards from each other, which he looks upon as the best distance. After these are properly arranged, he advises to dig a hole considerably larger than will take the roots of the stock, that the earth may be soft and mellow for them to strike therein more freely; and to have the stock ready with the roots and head pruned, particularly those that are bruised in raising; which must be placed upright in the hole. If some better mould, such as street-shovelings, or a compost made with rotten dung, good mould and lime (lime kills the ants, which are very destructive to stocks and trees), be mixed with the soil to fill the hole, it will expedite the growth of the stock. Care should be taken to fill up every vacancy between the roots, shaking the stock well whilst filling: when filled, tread the earth down to the roots pretty hard: then have a stake four or five feet long driven sideways in the ground leaning against the stock, pointing to the west wind, and firmly tie the stock to the stake with an osier twig, placing a hayband between the stock and the stake, to obviate galling: this will prevent the wind shaking the stock, which very often injures it, and prevents its taking root. We should then have six or eight black-thorns, pointed and stuck in the ground round the stock, reaching up to the head: these should be tied in two places with twigs, to prevent cattle or sheep from browsing on, rubbing, or peeling the stocks, which they are very apt to do, particularly young sheep. He has had stocks peeled quite round by sheep. The grease of the wool, when sheep rub against them, injures and retards their growth. Where wood is plenty, if three posts be erected triangularly round the stock, and laths nailed to the posts, it is the best fence. The stocks must now stand three years to take full root: at the end of which, those that have made free shoots may be grafted with what sort of apples the planter chooses.

In Kent, the method of planting apple-trees is to dig holes about two feet square, and two spits deep, taking out the stones, and turning down the surface-soil on which the young trees are placed, and the remainder of the earth is trodden down close about the roots: they are supported by stakes until they get sufficient strength not to be hurt by gales of wind. A composition of lime and night-soil is, with a bruth, painted on the stems of the young trees; which is said to promote the growth of them very much.

Fruit-trees are injured by various circumstances, as from having too much wood in them, the milletoe, moss, and spring frosts; which can only be prevented by the removal of the different evils, and by promoting their strength and vigour.

Mr. Bucknall observes, in the Transactions of the Society for the Encouragement of Arts, &c. that pruning is an important circumstance in regard to the health of trees and their bearing; and that, if it be judiciously done, they will come into bearing sooner, and continue in vigour for nearly double their common age. In performing this operation, he recommends, that no branches be shortened unless for the figure of the tree, and then constantly taken off close at the separation; by which

means the wound soon heals. The more the range of the branches shoot circularly, a little inclining upwards, the more equally will the sap be distributed, and the better will the tree bear. The ranges of the branches should not be too near each other, as all the fruit and leaves should have their full share of the sun. Where it suits also, let the middle of the tree be free from wood, so that no branch ever cross another, and all the extreme ends point outwards.

In the business of pruning, he advises all the branches that are any way decayed or galled, or where there are any curled leaves, to be cut out; after which the tree is to be thinned to give it an uniform head, and that the air and sun may be freely admitted. The stumps must then be taken off close to the parts of the tree from whence they shoot out. In doing this, particular care must be taken that they be cut close, smooth, and even, without shivering the bark. The cut ends next the tree, after being smoothed with a knife, must be immediately rubbed over with a substance composed of tar and corrosive sublimate.

When trees are much thinned, they are subject to throw out a great quantity of shoots in the spring, which, he says, should be carefully rubbed off, as cutting increases their number.

With regard to the extent of pruning required by an old tree, the author says: If it be very old, and much incumbered, do not let in the cold winds; but, with care, take off the stumps, with all the decayed, rotten, and blighted branches, leaving the rest to the discretion of each person, who will soon see how much is necessary; self-conviction being the best school for improvement. The truth is, whoever would form orchards to produce credit to himself and profit to his successor, must not suffer the trees to become old before the operations commence, but determine that pruning, cleaning, and rubbing off the rotten bark, should be begun in the nursery, and regularly continued to the extremity of old-age; from which method very little wood need be taken off at a time; and, by using medication, the wounds will heal, without causing any more blemishes than the tree was subject to at the time the limb was taken off; for it is not the first cutting which blemishes the tree, but the corrosion arising from neglect. Let each person therefore, says he, determine that no standard fruit-tree be suffered to remain incumbered with rotten and decaying branches; for these, admitting the water into the tree, and contaminating the balsamic virtues of the sap, lay the foundation of sure destruction to the tree, and furnish to insects a *nidus* under the rotten bark, in which they deposit their eggs.

He also advises, that the rows of trees in a fruit orchard should not stand north and south, but a point of the compass towards the east, as the sun will then shine up the rows soon after ten o'clock, which, in the spring of the year, will serve to dissipate the vapours collected in the night: these vapours stunt the fruit in the early stages of its growth; and, where the shaws are properly attended to, this position will best enable them to divide and blunt the power of the winds, and prevent blights, and the shaw might be a little brought over the south: but, as each situation has a predominant wind, this is only hinted to put the planter upon his guard: the shaw also will greatly protect the fruit from the severity of the autumnal winds, at which season half the crop of fruit is thrown from the tree before it is ripe; and the hedges at that time of the year being loaded with fruit and leaves, many trees are actually torn out of the ground, or so lacerated as to be spoiled; which a proper shaw might prevent. Judicious shelter, says he, should be the first object thought of in forming an orchard on a large scale.

It is likewise necessary, he thinks, that nurserymen be attentive to their grafts, for more depends upon it than is imagined; as, from the grafts being full, well wooded, clear, and properly chosen, the fruit will be both larger and higher flavoured.

Though the soil and culture may be the same, the health of the wood of the tree is also most materially affected during the whole time of the tree's existence, by the proper maturity the scion was in at the time it was first put into the stock.

Blights are very detrimental to fruit, the cause of which does not seem to be yet well understood. It is likewise liable to be hurt by insects; for the destruction of which, Mr. Gullet, in the *Annals of Agriculture*, recommends the following method—after observing that they are deposited in their egg-state by a fly, in the bud of the apple, or blossom, at its first opening, and soon become maggots, which exhaust the nourishment of the blossom, which with the slightest touch will fall off—to set fire to some heaps of wet straw, weeds, or any other like matter on the windward side of the garden or orchard, viz. if the wind be east, let the fumigation be from that point, so that the smoke from the heaps may blow through the tree for some days. The expense attending this, says he, will be very trifling, considering the beneficial effects of it, as it will not only destroy the insects for the present, but prevent them from depositing their eggs.

The fruit should be gathered when full ripe, and will quit the tree by gentle shaking: if gathered before it is ripe, the liquor which is prepared from its juice will be rough, hard, and seldom pleasant or good flavoured. They may be laid on the ground in a fruit-yard; but it is better if upon a gravel walk, as the wet will run from them, and they will lie dry in the bottom; and they should not lie thicker than ten or twelve inches. They are better kept without than within doors. Care should be taken to place fruits of equal ripeness and good qualities by themselves; for if of different ripeness the cyder will be apt to ferment too much, which will cause it to grow hard, and never be rich, full and fine-flavoured.

SECT. XXXIV. *Of Making Cyder.*

THIS is a chemical process, which does not seem to be yet conducted on any fixed or regular plan, as we find different manufacturers recommending different modes of collecting and managing the fruit, as well as of conducting the several processes in the preparation of the liquor. The following is the method recommended by Mr. Morse, which seems to be sufficiently clear and simple:

When the fruit is thoroughly mellow, it must be committed to the mill for the purpose of cyder making, which is formed with a stone-chase and roller, something similar to a bark or a sugar-mill. The roller is drawn round the chase by a horse. Here it should be ground to a pulp, that no bit of apple may be seen, and until you cannot hold it in your hand, if you take a handful and squeeze it: the kernels and rind will then be well broken, and will give the liquor a fine flavour. Let it be put into tubs or hogheads with one head out, and remain there two days; then press it through hair-cloths. I use, says he, fourteen or fifteen, putting about two pails full in each, turning up the sides and corners; then put another on until the whole are filled, when press it with a screw: put the juice into hogheads: after it has been there a few days it will work and throw up a thick substance at the bung hole, somewhat like barn, but of a darker colour: when this appears it generally is dropt fine, and should be immediately racked into a clean cask; for, if the substance be suffered to fall, the grounds from the bottom will rise, and the whole will be in a ferment and very foul, and perhaps must be racked three or four times before it can again be separated and got fine; and will run a risque of making the cyder harsh. So long as it remains fine and free from fermenting, it may remain in the cask; but if it ferments much it should be racked, and the grounds or lees taken from it. These may be dropt through a bag or bags of coarse cloth, made in the form of a jelly-bag, with a hoop sown round the top to hold about a pail-full: by

doing this very little cyder will be wasted, and the droppings added to the cyder will be a mean to keep it from fermenting, and will also help the colour. It often requires four or five rackings. Cyder made with different sorts of apples keeps best by breaking and mixing together; but this should not be done until it is fine, when the proprietor may blend it to his palate. After the whole is done, a bung may be placed over the bung-hole, but should not be close stoppt until February or March, when it will be fit for sale or use. If cyder do not fine, some farmers use string-lafs. For one hoghead, of a hundred gallons beat about one ounce and a half and pull it to pieces; add to it about two quarts of liquor, and whisk it together; next day add more liquor, and whisk it again: repeat this until it be dissolved, and beaten fine. Rack your foul liquor, throw in the dissolved glass, and stir it together with a stick. As soon as it drops fine, rack it off into a clean cask. Cyder should not be bottled until sixteen or eighteen months after it is made, as it will endanger the breaking the bottles, if put into them sooner.

Perry. The same method must be followed in making of this liquor as in that of cyder. The best pears for perry, or at least the sorts which have been hitherto deemed the fittest for making this liquor, are so excessively tart and harsh, that they cannot be eaten as fruit: Of these the *Bosbury pear*, the *Bareland pear*, and the *Horfe pear*, are the most esteemed for perry in Worcestershire, and the *Squash pear*, in Gloucestershire; in both which counties, they are planted in the hedge-rows and most common fields. Pear-trees will thrive on land where apples will not even live, and some of them grow to such a size, that a single pear-tree, particularly of the *Bosbury* and the *Squash* kind, has frequently been known to yield, in one season, from one to four hogheads of perry. The *Bosbury* pear is said to yield the most lasting and most vinous liquor. Pears, as well as apples, should be fully ripe before they are ground.

Cyderkin and Perkin. These liquors are prepared by pouring boiling water on the dregs that remain after the making of cyder or perry, in the proportion of about one half the quantity of the liquors that have been previously drawn. After being left to infuse for 30 or 40 hours, it should be pressed very well, and what is thus squeezed out turned up for use.

Cyder Wine. This has been prepared in America, and even in this country, from the juice of apples by *boiling*. For this purpose a browning copper is made use of, in which the fresh apple-juice is evaporated, until one half of it be dissipated; the remainder being then conveyed into a wooden cooler, and afterwards into a proper cask, to which yeast is added, and the liquor fermented in the usual way. The experiments of Doctor A. Fothergill, however, seem to shew that cyder wine thus prepared, contains a slight impregnation of copper.

SECT. XXXV. *Of Cherries.*

IN Kent, they generally prefer for this fruit a situation where there is a deep surface of loam upon the rock. But by some it is said that there is not any necessity for a great depth of soil. In respect to distance apart, cherry-trees require to be planted according to their sorts; a *heart* requiring double the distance of a *duke* or *morello*. But when planted by themselves, they are generally placed from twenty to thirty feet distant, and are put somewhat deeper in the earth than apples; but in other respects the management is the same.

Cherry Wine. A cooling and pleasant drink is made from the juice of cherries when properly fermented. For making this liquor the cherries should hang upon the trees till they are thoroughly ripe, in order that their juice may be better perfected and enriched by the sun; and they should be gathered in dry weather. The juice is then to be pressed out, and a quantity of sugar proportioned to the intended strength of the wine is to be

added, and the whole regularly fermented. When the wine is become fine, it must be bottled for use.

SECT. XXXVI. *Of Filberds.*

THIS fruit is much grown about Maidstone in Kent. The soil best adapted for them is the stone-shattery sandy loam, of a quality somewhat inferior; as it is a disadvantage for the trees to grow with great luxuriance, they bearing most nuts when but inoderately strong. If they are planted among hops, without apples or cherries, they are put about twelve feet apart: when the hops are dug up, the filberd plantation is kept clean by repeated digging and hoeing; and great skill is necessary in pruning, to make them bear well. It is indeed entirely owing to skill and management in this operation that the trees are rendered productive upon even a favourite soil. These trees are generally trained in the shape of a punch-bowl, and never suffered to grow above four or five feet high, with short stems, like a gooseberry-bush, and exceeding thin of wood. If suffered to stand till ripe, this fruit will keep good for several years in a dry room or closet; but when gathered, they should be laid thin on the floor of a room where the sun can get in to dry them properly.

SECT. XXXVII. *Of the Cultivation and Management of Timber and other Woods.*

A VERY judicious writer on this subject observes, that it is a truth which has escaped the observation of few, that every kind of vegetable, from the loftiest oak to the minutest plant, thrives better in some soils than in others; and generally the better the soil, the more luxuriant the growth; but that, fortunately, a soil is rarely to be met with which cannot supply nourishment sufficient for the profitable growth of wood of some sort or other. It is not always, or indeed often, that plantations of timber and other wood do not prosper through poverty of soil, as has been commonly imagined; but generally from the situation being too much exposed to the unfriendly chilling quality of strong winds, which are injurious if not destructive to vegetation, in every kind of subject; and nothing suffers more than timber and wood of all kinds, through want of protection and the kindly warmth it affords, as is very evident from numberless instances of strong healthy trees suddenly falling into decay, upon imprudently cutting away the wood growing about them, and too suddenly exposing them to the rigour of a cold and inclement situation. Advantageous, however, as promoting and extending the planting of timber and wood, in every point of view, may appear, it is not to be understood that the immense quantity of waste land in this country should be planted: perhaps one acre in twenty, or at most one in fifteen, would be fully adequate; so that the planting those lands, which in their present state are of very little value, would be so far from diminishing the quantity of pasture and arable land, that it would add immensely to it.

The success of every practice affords the clearest and most satisfactory evidence of the truth and justness of its principles. It is now about eighteen or nineteen years, says Mr. Wimpey, since we began to plant on this spot. Such bits and pieces of land were chosen as afforded no kind of profit whatever; some a quarter of an acre, some a half, some several, but none of any value. As it was meant by way of experiment, every species of pines and firs which are commonly to be met with were planted; as likewise every kind of forest tree that is usually planted in England. The pines and firs run now in general from 20 to 30 feet high, and their circumference in proportion. One of the largest pinasters being measured at two feet above the ground, the circumference was found to be fifty inches; and a spruce fir at the same height was thirty inches; and many silver, Weymouth, and Scotch, considerably more. The forest trees are equally prosperous. A chestnut, planted some years

since the above, is between 20 and 30 feet high, and 25 inches in circumference a yard above the ground; and most of the kinds which were planted have thriven equally well, a few of the softer woods only excepted. He says, poplars, tree willows, and abeles, do not succeed here; they are aspiring trees, and generally shoot up to a great height in a favourable situation; but it seems they cannot bear the rigour of the cold winds in such an elevation, nor do they thrive when protected by hardier trees which shade and overtop them; for it happens to them as to most other plants, when the leading shoot is so much injured as to stop its vegetation, the whole tree soon falls into decay, and seldom thrives afterwards.

It has been found that wherever the plantation is five, six, or more trees deep, the whole has succeeded to admiration; but when they have been planted single, very few indeed have succeeded. It is true, many of them are alive, but never likely to make timber, being stunted in their growth, decrepid and decaying. As the soil, situation, and exposure, are the same for those as the other, the sole cause seems to be the want of that warmth and protection which the other receive from being planted in large numbers. The forest trees succeed no better than the firs and pines if planted single, the beech, hornbeam, and sycamore excepted; these, especially the beech, seem to thrive in every soil and situation, in defiance of all wind and weather. Not so the oak and ash; the first particularly suffers as much for want of warmth and protection, as any tree which is a native of this island. From this account of the success of these plantations, says the author, it evidently appears, that planting such soils with wood would be attended with the greatest advantages; not only as affording a large profit arising out of the thing itself, independent of every collateral consideration; but as the certain means of improving very large tracts of land, which in their present condition are of very little value, and by no means capable of improvement, but by being forced in and planted with wood. The method which he recommends for the planting and improving of such waste grounds is the following:

1st; To dig a broad ditch, and raise a high bank all round them, by way of fencing them off; then to measure out from the inner brink of the ditch, three or four perch or pole on every side, to form a margin, which should be thoroughly ploughed, pulverized, and made ready for planting in the spring. The exterior line should be sown with white-thorn berries in a double row about a foot asunder, row from row. At four feet distance from the same, a shallow furrow should be drawn, and so on at that distance from one furrow to another the whole breadth of the margin. As we advance from the outside, every row of plants will be more and more protected; therefore, the hardiest trees should be planted outermost, which may be in the order following: first, beech, horn-beam, or sycamore; the next may be ash; the third row, chestnut; the fourth, oak; the fifth, cherry; the sixth, pines, firs, or larch; then chestnut again, or a repetition of any of the former, as the planter may judge proper. This would serve as a nursery, and provide plants sufficient to plant all the interior fences. Each interior fence should have ground sufficient for a double ditch, if thought necessary, and a broad high bank. These banks will require three lines of sets to plant them, one on each side about two feet from the bottom of the ditch, and one on the top exactly in the middle. It will also conveniently admit of two rows of trees for timber, to be planted about two feet high in the bank on each side, at the distance of a pole from each other: those on one side to be planted opposite to the intervals on the other.

The most formidable difficulty which occurs in this scheme, is, says he, the time and expence required to establish the outward fence. If the outer line be sown or planted with white or black thorn, with holly, crab, beech, &c. it must be fenced for

several years, to defend it from the bite of cattle, which requires more patience and expence than is usually allowed, though absolutely necessary; but there is an easy method of making an outward fence, which in two, or at most three years, will be very secure, without further expence and with little trouble. This is by the planting of a *withy hedge*, which is a hedge composed of fallows, willows, and osiers, on the brinks of the ditches and banks of the fences.

The manner of doing this is as follows: A sufficient number of strong *withy stakes* are to be prepared, by cutting them from three and a half to four feet long, and from one and a half to three inches diameter: being cut sharp at the lower end, they are to be thrust or driven into the ground about 15 or 16 inches, or till they are firm, at the distance of about 14 or 15 inches one from another in a line: then an equal number of shorter sets must be prepared; these may be 15 or 16 inches long, and from three quarters of an inch to an inch and half diameter, and must be thrust into the ground about 10 inches deep, leaving about six out, to be planted one in the middle of each two of the former, then they will stand in alternate succession. The tall strong stakes must be fastened together by a whale or kind of chain, such as the hedgers weave on the tops of the dead hedges; they are made of three hurdle rods of the same wood. If stakes and sets be cut any time in January or February, and planted in open weather in a few days after they are cut, very few of them will fail of growing, and in two years time the shoots from the stakes and sets will be long enough to be woven flakewise; those from the short sets into the bottom and middle of the hedge, and those from the stakes into the upper part and top of the same. At that age they will be flexible enough to be wrought in without cutting, which is practised in older and larger shoots to the great damage of the hedge. A fence thus managed will be very secure, and stand an age with little expence or trouble.

It is also observed by Doctor Anderson, that waste and barren lands may be very conveniently improved by planting trees on them. There are few fields, he thinks, which might not admit of being brought into culture, under particular circumstances; and there are innumerable tracts of vast extent in this kingdom, which it will be much more profitable to the owner to plant with trees, than to attempt any other mode of improvement. Wherever the soil is dry and infertile; or where its chief or only produce is heath; or where it is full of rocks and stones rising to the surface; or if it be a stiff obdurate clay, having little surface produce; and in general, in most cases where the soil is poor, if not in the very near vicinity of a town, it may be converted into plantations, if it can be freed from hurtful water, with greater profit than any other improvement it could admit of, unless in very particular circumstances; even where it may admit of being brought *in time* into cultivated ground. Where the surface-produce is naturally small, perhaps nothing could be so economical as, *in the mean while*, to fill it with trees; because these, if judiciously chosen, not only yield a greater profit than could be drawn from any other kind of produce, and afford conveniences for houses, and other accommodations for inhabitants and for manufactures, but the ground itself, while the trees continue to grow upon it, undergoes for the most part a gradual amelioration, which it would not have done in its natural state; and admits of being more easily improved when the proprietor can find leisure to overtake it, than it otherwise would have been.

The kinds of trees, he says, which it would be best to cultivate, are the oak, ash, elm, beech, birch, chestnut, Scotch fir, spruce fir, and the larch. Of these the oak is best calculated to thrive on the strongest and deepest clays; the ash loves a rich and mellow loam; and where that is the case it prospers best on rocky banks. The witch elm prefers also a mellow soil, and situ-

ations moderately damp, to such as are drier and more arid. The beech thrives remarkably well on dry gravels, and can bear a pretty exposed situation. The birch loves dry mellow soils, and will prosper well on land that is very sterile. The chestnut delights in deep loam, on a stone shivery bottom, where the roots run no risk of reaching a retentive clay or other stratum that detains the water. The Scotch fir as well as the spruce will grow well on a light moory earth, if dry, though ever so poor, if cold clay does not rise near to the surface, or gravel, or sand. But of all the trees that have been named, the larch prospers on the greatest variety of soils: I have scarcely, says the Doctor, seen it fail on any soil where the water was not permitted to stagnate upon it; but it seems to prefer a mellow loam to either of the extremes of clay or sand. And as this tree is undoubtedly the most useful of the coniferous tribe, as well as the quickest grower, and the most ornamental of that class, it deserves above all others the attention of the rural improver.

Mr. Kent recommends the tall straight-growing pinaster to the attention of all planters upon poor light lands, as it seems to exceed most others in growth. It is frequently planted with Scotch firs; and, when they grow up together, by many incurious people is taken for a Scotch fir. But I have (says he) always remarked its superiority of size when mixed with it, and of the same age. In short, it frequently grows as fast as an alder, or an ash; and therefore, if it be planted merely with a view of being cut down for fuel, it will be found a very profitable tree in many parts of England: but as it will grow to a very large size, it will, in his opinion, be found applicable to many useful purposes, as it admits of being cut into very large scantlings.

He also observes, that when new plantations are made, it is always best to make them in as large a body as the ground will admit of, and, if there be time, to clean the land well. He recommends such plantations to be made from seed in drills, rather than with seedlings, keeping the ground clean till the plants get high enough to protect themselves: but it sometimes happens that single trees are planted with propriety in parks and lawns, upon small swells and eminent spots, where a large plantation would be too heavy. In such cases it is a good practice to open a very large hole, at least six feet in diameter, and full eighteen inches deep, in the spring, and the ensuing winter put three or four plants of different sorts into each hole; guarding them with a triangle frame, which will be more durable than a square, and much cheaper than a circle; and, the stuff being found, this may be erected five feet high, with pales six inches apart, all workmanship and nails included, for 3s. 6d. each. The reason for putting four plants into a hole, is not only to have the greater chance of raising one good tree; but it will sometimes happen, that two or three of them will unite and mix their branches together, and form a most beautiful head of different tints, and, by extending their principal roots different ways, draw sufficient nourishment for a permanent support of their union.

He concludes by reprobating the custom that prevails, in some counties, of pruning up trees, by divesting them of their lower or lateral branches. When a plant is very young (says he), it is sometimes allowable, to a certain distance, but should always be done with great caution; but when trees have begun to form themselves, it is a sort of murder—it stops the growth, and produces extreme deformity; for the sap, in the spring of the year, being checked in its natural diffusion into the number of branches into which it used to flow, becomes distorted.

The following are the judicious observations of Mr. Davis on the management of under or coppice wood, and of the timber grown therein:

Underwood, Nature of its Growth and Cause of its Decay.—The stocks which produce Underwood or Coppice wood, being in

fact only *pollard trees growing under ground*; it is obvious that the produce of those stocks must, like the shoots of pollard trees, be the most abundant when the parent stocks are in the greatest perfection; that until they attain that perfection, the produce must be small; and that, when they are past that perfection, they gradually decline; the shoots from them become weaker and fewer every successive cutting, and the stocks finally decay and die. It therefore follows, that to prevent the decay of woods, it is necessary, from time to time, to renew them by raising new stocks, to supply the place of those which from time to time wear out and decay. But besides the constant and regular decay of age, to which all woods are liable, there are many injuries to which they are subject, and which will very speedily and prematurely bring on their decay, unless proper and effectual methods are taken to prevent those injuries.

The first is, the pernicious custom of suffering cattle to feed in woods, under an idea that, after they are of a certain age, (usually seven years) the shoots are grown out of the way, and that the cattle can do no harm. In strong, thriving, flourishing woods, it is possible that cattle may do *but little harm* to the underwood, after it is seven or eight years old; but all the young plants, which either spring up spontaneously or are planted in them, will be liable to be cropped and kept down by the cattle, and few of them can come to perfection. And in weak decaying woods, there is *always* a great deal of the underwood so low, as *never* to get out of the reach of cattle, but continually liable to be cropped and kept down by them, and the decay of the stocks thereby much hastened.

And another cause of early decay of woods, is *the want of draining* such parts of them as are subject to be moist and damp; *nothing being so prejudicial to wood as too much wet*. A third cause of decay, is *the custom of suffering woods to grow too old before cutting*, whereby the strong shoots smother the weak ones, and, by their dropping, kill the stocks on which they grow. To this may be added the practice of permitting the *lwyer* to cut the wood, thereby making it *his interest* to destroy every sapling, and *to cut the underwood as close to the stock as possible*—(which in old woods is very prejudicial to the succeeding shoots)—as also the custom of not obliging the buyers *to clear the woods early in the summer*, so as to prevent the new shoots from being injured by their cattle, carriages, and other circumstances.

Of Recovering Decayed Woods.—On this subject it must be observed, that if it be profitable to plant new woods, it is certainly much more so to protect those that are already planted, to fill them up where thin, and to restore them when in a state of decay. The expence is not only lessened by the saving of new fences, but the profit is greatly increased, by the rapid growth of the wood, when planted in situations that are sheltered by other woods already planted. In those woods where saplings spring up in great numbers *spontaneously*, their growth should by all means be encouraged. At the time of cutting the underwood, these saplings will perhaps be 14 or 15 years old; and it might appear proper, after leaving for timber trees such as are straight and handsome, to cut off the rest for underwood. But great part of the saplings so cut off *at that age*, will not be large enough to produce shoots *sufficiently strong* to get up as fast as the other underwood. *These shoots* would therefore suffer, and the stocks would never come to perfection. It is, therefore, more advisable not to cut off such saplings as are intended for underwood, until the *second cutting* of the wood, when (being perhaps near 30 years old) they will throw out shoots *strong enough* to fight their way, and keep pace with the surrounding underwood. But where saplings do not spring up in abundance spontaneously, young trees must be planted; part of which may be preserved for timber, and the remainder left, to be stubbed off at a proper time for underwood.

Of the Kinds of Wood to be planted.—The kinds of wood to be planted in coppices, either in making new ones, or filling up old ones, must be regulated, partly by the demands of the country, but chiefly by the peculiar aptitude of the soil and situation to produce particular sorts. *Let nature be your guide in planting* (says Mr. Davis), *and you will seldom do wrong.*

But particular soils and particular situations (says he) will always favour particular kinds of trees; we need not look for the reason, but only for the fact. The chalk-hills of Hampshire are peculiarly proper for beech; the stony loams and clays of the same county, for oak and ash; the mossy steep sides of the Wiltshire downs, for hazel; and the sands of the same county, for ash; the rugged and almost naked rocks of Mendip, in Somersetshire (near Cheddar), produce the lime tree and the walnut in the greatest luxuriance; and on the highest parts of the same Mendip hills, where no other tree can stand the sea breeze, sycamore flourishes as well as in the most fertile valley. But taking the general demand of countries, and the peculiarities of different soils, into consideration, there is no kind of wood so generally proper for planting in coppices, as ash. The value of ash-poles being at least one-third more, and frequently as much again, per hundred weight, as that of other poles (being applicable at all sizes to some useful purpose or other); the timber being always in request, and saleable at any age or size, at almost the price of oak; and the wood itself being as quick a grower as any, and quicker than most; and above all, there being but few soils, from the blackest and wettest bogs to the highest and most exposed mountains, where it will not grow; are reasons why ash is one of the most profitable woods to plant in such coppices as are favourable to its growth. In soils and situations where ash does not grow kindly, let such other sorts of woods be planted as appear to thrive best in similar soils and situations in the same country. Spanish chestnut, though not so general a grower as ash, is a most excellent wood, either for timber or underwood, and wants only to be more known to be higher in estimation. It partakes much of the properties of oak, but excels it in two points, viz. that it grows faster, and that the sap part of the timber is firmer and less corruptible. To fill up woods that are grown thin by age or neglect, the proper time is one year, or at the utmost two years, after the underwood is cut. The young plants should be eight or ten feet high, and an inch and an half in diameter at the ground, and should be planted without cutting off. If the soil be dry, no other preparation is necessary than barely digging the holes for the plants. If wet, deep drains should be made to take off the superabundant water. The earth dug from these drains should be thrown out on the lower side of them, and upon this new earth the plants should be planted. If land of this latter description be black and peaty, ash is peculiarly proper for it; and will, if planted on the earth thrown from the drains, make a most surprising progress. If it be a stiff yellow clay, it is generally more favourable to the growth of oak than of ash. In such soils, oak for timber, with a mixture of willow, birch, alder, and Spanish chestnut, for underwood, will perhaps be the most proper. All these kinds should stand one round of the underwood, and, if still weak, should stand two, before those are cut off which are intended for underwood, for the reasons before given. Birch plants are indeed an exception to this rule: they should always be cut off the first round of the underwood; for, if they are large when cut off, the stocks frequently decay and die. In all mixtures of kinds of wood for coppices, those sorts should be used which are not unfriendly to each other, and which will come round fit to be cut together at the same periods; and such kinds should be allowed to stand for timber, and that at such distances as to injure the underwood as little as possible. The plants for filling up old decayed woods should be the strongest and best of their kinds. Those which are weak at first will be drawn up by the

surrounding underwood, and become from their increased height still weaker. At the next cutting of the underwood, they will be blown down; or, if cut off, the shoots will be too weak to grow up with the other underwood. Oak, ash, and Spanish chestnut should be kept in a nursery for this purpose: alder and birch plants grow plentifully, spontaneously in some countries, and may be taken up for use: if none such are to be obtained, they may be raised from seed sown on a moderate hot-bed in the open air. Alder is sometimes propagated by taking up old roots, and dividing them into several parts; and hazel may be propagated the same way. Willow is generally planted in cuttings; but a much better way, where there are any old willow stocks, is to plash down the shoots to fill up the vacant places round such old stocks. The wild cherry, which will grow on almost any soil, and is easily propagated, makes an exceeding good underwood, though it yet has been but seldom used for that purpose.

Of making Coppices.—In choosing spots for making coppices, care should be taken to select such soils and situations as are proper for the growth of those kinds of wood intended to be planted; to drain them well if wet, and particularly to fence them well from cattle; and if they be covered with bushes and briars, to let those remain for shelter for the young wood; and if there happen to be a moderate quantity of young oak and ash trees on the spot, to let them stand by all means, always keeping in mind how necessary shelter is, for the growth of wood of all kinds and sorts. But in newly planted woods, where all the plants are of the same age, there is not the same reason for letting them stand before they are *st. old* off for underwood, as before directed for young trees planted to fill up old woods. Those which are intended for underwood may, in such newly planted woods, be cut off when planted, or at any age from 8 to 14 years, without any injury: indeed, young woods should not stand too long previous to the first cutting.

Of the proper Age for cutting Underwood.—The periods of cutting underwood must be regulated by the luxuriance of its growth, and by the demand of the country, and the uses to which the wood is to be applied when cut. In the article of underwood, not only the interest of money, but the loss of the succeeding growth, tell against the value of standing wood after it is fit to cut, and make it doubly the advantage of the owner to cut his underwood as early as it is saleable. As soon, therefore, as any kind of wood is fit for the uses of the country, it should then be cut; unless it can be made appear, that it will pay compound interest for standing longer, or, in other words, will pay not only the simple interest of the first value, but also the loss of so many years growth of the wood, as so far advanced towards another crop. Wood merely for fuel can scarcely be cut too young. Hazel is usually fit for hurdles and dead hedges, from 9 to 12 years old; ash for sheep cribs, at the same age; and ash and other woods, for hop poles, from 11 to 14 years old; while ash for carpenters and other large uses, alder, birch, and willow, for rafters, turners' uses, pattens, clogs, coalpit uses, &c. must stand from 16 to 20 years old, before the poles are large enough for their respective purposes.

Of the Time of cutting Woods.—Various opinions have been advanced respecting the most proper time of the year for cutting underwood; but there is one rule which, on the seller's part, is without exception, viz. that the older the wood is, the later in the spring it should be cut. When old wood is cut early in the winter, and a hard winter follows, the damage done to the stocks is very great; young flourishing wood will bear cutting at any time. But on the part of the buyer it is allowed that all woods are more durable, when cut in the most stagnant state of the sap; and in all uses where bending is required, such as hurdles, hoops, and even dead hedges, the wood cannot be cut too early in the winter, being, if cut when the sap is rising, brittle, and

unfit for those purposes. Oak underwood will (at the present price of bark) pay well for standing till the sap is up for barking it, and it seldom happens that the stocks are injured by cutting it so late in the season.

Of the Manner of Disposing of Woods.—In our author's opinion, the best way of disposing of underwood, to answer the purposes of the feller, is to cut it *at the feller's expence before it is sold*; to lay it out in ranges or drifts, according to the custom of the country; to value it in that state, and sell it in such sized lots as the number of buyers will warrant; and particularly to oblige the buyers to clear the whole out of the wood by the 24th of June, and never to suffer them to bring their horses into the woods (after any new shoots are shot out) without muzzling them, or at least tying up their heads.

Of Timber growing in Woods.—In every wood where timber will grow, it should by all means be encouraged, and, if it does not come up spontaneously, should be planted. A proper quantity in woods is so far from hurting the underwood, that it is both *necessary* and *useful*, to shelter the underwood and draw it to a proper height; but that quantity must always be regulated so as to do as little damage to the underwood as possible. Oak and ash timber, and in proper soils Spanish chefnut, are proper for woods. Beech should never be suffered. It is a most unneighbourly tree, and should not grow with any sort but its own—nothing can live under it. When the woods are cut, it is common and proper to cut such timber *as begins to do damage, by its dropping, to the underwood below*. This is the *proper criterion* by which timber in woods ought to be cut, if it be the *wish* of the owner, as it is his *interest*, to keep up that proper proportion of timber and underwood, by which each shall receive benefit from the other, and the land produce the greatest profit which in a state of wood-land it is capable of yielding.

On this subject Mr. Pitt remarks, that with regard to the proper ground for plantations, every gentleman or land proprietor of prudence and taste, who resides on his property, will furnish himself with a shady retreat from the burning sun, that shall afford at the same time a shelter from the storms of winter. For this purpose he will keep up a sufficient shade near his habitation, in that situation which local circumstances shall direct. Large plantations or coppices for profit should not be made on good land; always of much more value for corn or pasturage; but either on moist land of small value, upon a clay or marle bottom, where timber often grows well; or rather, where such land abounds, upon precipices, and sides of hills impracticable to the plough; and where it often happens the land unplanted is of little or no value. He has often observed, that timber succeeds particularly well in such situations; and that making plantations there is attended with many advantages.—
1. The roots of trees twining and interweaving with the soil, prevent its being washed by torrents into the valleys, which is the cause why many such situations are now bare and almost void of soil. 2. The falling and putrefaction of leaves tend to thicken such soil, and render it by degrees richer, and more capable of

forcing the growth of timber. 3. Such land is often of little value, and incapable of being improved in any other way. And I cannot refrain, says he, upon every occasion, from calling particularly upon all public and patriotic societies to confine their premiums for planting, to land of small value, or impracticable to the plough. The corners of fields, where four unite, are not improper places for small clumps in any land: and in hedge-rows a few oaks, elms, or beeches, are a great ornament, without doing an injury: but ash, always very injurious to arable and pasture land, should by no means be planted in hedges, but reserved for clumps and coppices.

Respecting the sorts of wood, oak is undoubtedly the first forest tree; but being slow of growth, the planter can seldom expect personally to reap the reward of his labour: it should, however, be always plentifully intermixed with other sorts, where it will be ready to supply their place, and fill up the ground when its inferior neighbour shall be cut away. He thinks, without a mixture of oak, no plantation can be improved.

Ash is an extremely useful and valuable wood for many purposes, but not very quick of growth; requiring from fifty or sixty to eighty years, to arrive at tolerable maturity. Elm, the common or narrow-leaved, is very proper for hedge-rows and plantations; it makes a large tree in about the same time as ash. Respecting the fir tribe, he says, planters have certainly been rather too partial here, though many of them are of rapid growth. The larch, or Scotch and other firs, will often measure as many feet of timber as they number years of growth, or even more. He strongly wishes, however, that every gentleman making a plantation of firs would intermix at least an equal number of English forest trees, and not forget oak. As such plantation proceeds in growth, the trees least profitable may be cut away. Beech and fycamore are useful, and of tolerably quick growth, and are therefore a proper mixture with other wood. Many instances may be produced of the rapid growth of poplar; and the same individual has been known to plant and cut down poplars containing from sixty to eighty feet of timber each.

The black poplar succeeds best on a moist soil, or by a brook side. The trees of this sort are apt, however, in some seasons to die in great numbers, even when large trees. But the white poplar, or abele, makes a fine large tree, and will succeed on almost any soil. The Lombardy poplar, he observes, so highly extolled some years back, is a mere weed in comparison of our own native trees before named, and little superior to the aspen, the worst of the species. The Lombardy poplar in this country is a pole rather beautiful to the eye, but of no promise as a timber-tree. The wood of the poplar in general makes very good flooring-boards and packing-cases. Some of the willow species are remarkable for quick growth; and the loppings in the hop countries are useful for poles. He also remarks, that among plantations, perhaps that of fruit-trees has been too much neglected.

P A R T III.

OF THE MANAGEMENT OF LIVE STOCK.

WE must now proceed to consider the different management that is necessary for the purpose of breeding, rearing, and fattening the various kinds of animals that constitute the live stock of those engaged in the business of farming.

The proper management of cattle is unquestionably a matter of the utmost importance to the practical farmer, as a great part of his property must constantly consist of this kind of stock,

and the maintenance of them form one of his most expensive engagements. This sort of stock admits of being distinguished under two different heads, viz. The cattle which can be employed in the business of the farm; and such as are for the purpose of sale. Those of the first kind are chiefly horses, though oxen might probably on many occasions be advantageously employed by the judicious farmer.

Horses.—These are of very different kinds; but it is only those of the draught breed, as being applicable to the purposes of agriculture, with which we have any business in this place.

The ingenious Editor of the Transactions of the Bath and West of England Society makes these very just observations on these animals:

Wherever (says he) horses are used in agriculture, it is of great importance to adapt their shape and size to the business required. It is an object worthy of much consideration. Some particular size and properties of the horse must claim a decided preference. It cannot be right to encourage all, or various growths, for similar purposes in similar situations: and there is so great a difference between the expence of a horse, far too big and heavy, and one of sufficient size to answer the end (whether we consider the *keeping*, the *movement*, or the *casualty* which attaches to large and costly horses), that the prejudice for *heavy* seems to require much correction. It is a known fact respecting this animal, that strength of bone and sinew is not in proportion to largeness of size; but they are found to be dense and strong as the horse approaches in fineness, even to the racer. And those farmers who have made close remarks on this subject, and have given a fair trial to the lower compact horses, not fifteen hands high, but of good symmetry, have found and must find their account in using them. Perhaps a stronger proof cannot well be urged in favour of a diminished size, than the well known capability for great labour, even of the small horses of the New Forest, when trained to waggon uses. This is a fact which, if duly reasoned from, would remove much prejudice, and do much service to the country. One strong inducement to many capital farmers to breed and train colts of the largest size, is the demand for dray-horses in the capital, and the large prices they bring: but these inducements cannot operate generally; and perhaps, in most instances where they do operate, they influence too far for individual or general advantage.

The kinds of *draught horses* most in use at present seem to be the *heavy-blacks* from the Midland counties, the *Suffolk punches*, and those from *Clydesdale* in Scotland. The *Lancashire* and *Yorkshire horses*, with crosses of different breeds, are also frequently employed in agriculture in different parts of the kingdom. Those of the latter county are in general in high estimation for the purposes of the saddle.

In the breeding of horses, particular attention should be paid to the choice of brood mares and stallions. This is constantly done in those counties which are the most famed for their breeds of horses. Almost every thing, says Mr. Marshall in his *Rural Economy of Yorkshire*, depends upon the mare. What are a few guineas in the first purchase of a good mare, compared with the difference between a race of good and of ordinary horses!

In Norfolk, the horses for agricultural purposes are short and compact, as well as active and hardy, and generally about fifteen hands high. Those of the original standing, and those with the Suffolk cross, in the opinion of Mr. Kent, are equally good.

In the Isle of Shepey, the horses for the plough are bred principally from a sort that has been in the idle time out of mind. The mares are covered by stallions that come over from other parts of the county in the season; they are somewhat of a size smaller than those of other parts of Kent, where the land ploughs much lighter. Whether smaller horses are found to answer best there, it is not easy to determine; but it is natural to suppose, that such very stiff heavy land must require strong horses; it seems, therefore, that the breed of them here is become small from neglect; and it would perhaps be better if more attention was paid to the breeding and rearing the colts in these parts.

In Dorsetshire the farmers pay but little attention to the

shape, size, or symmetry of the cart-horse. The stallions are chiefly working-horses of farmers, and cover mares at half a guinea each for the season; and an average price for a cart-horse, at five years old, is sixteen or seventeen guineas.

In Staffordshire, Mr. Pitt says, the colour of the horses is most generally black or brown, each being equally esteemed, and equally useful; and some valuable stallions are kept of each colour. But in respect to the breed of horses, he thinks this county must yield the palm to the neighbouring ones of Leicester and Derby: indeed, breeding horses is by no means a main object, being carried little farther than to supply the county, and also the neighbouring fairs with a few.

Feeding Horses.—To determine with accuracy what is the most economical and advantageous plan of feeding and managing horses, would be a matter of much utility to the farmer; but it is a subject of considerable difficulty, and which cannot be considered fully in this place.

The methods of feeding and managing these animals are very different in different counties; but the two principal articles of their food, especially in winter, are mostly hay and corn. If artificial grasses were employed for working horses, cut green, the Earl of Dundonald suggests, that a very few acres would suffice. The plants best adapted for this purpose are red clover, tares, and sainfoin. The same author also thinks, that it is a matter of great importance, that the food intended for working horses should be so prepared, or of such a nature, as to allow them quickly to satisfy their hunger, that more hours may be allotted for rest during the interval afforded from labour. When thus fed in stables or farm-yards with green clover, tares, sainfoin, &c. unless on extraordinary occasions, he thinks they do not require oats or other grain; but in the winter or other seasons, when fed on dry hay or straw, and when occupied in the business of the farm, a supply of oats, other grain, or nourishing food, is found to be indispensably necessary. Oats, mixed with beans or pease, is the grain generally given, although (says he), when barley is at a certain price, it would be an object of economy to make use of it in lieu of oats. The horses in Spain and Portugal are exclusively fed with barley, to which they give a preference. The greater proportion of meal or farinaceous matter contained in barley than in oats is certainly in favour of this practice. By the breaking of grain, by passing it through rollers, or crushing it in a mill, horses, not being ruminating animals, must receive considerable advantage, and the loss or waste, by swallowing their corn whole, be prevented. Barley boiled in sea water, or with a due proportion of sea salt, is also a good support for hard working horses. These economical modes of feeding horses (says this ingenious writer) have been confirmed by several years experience in keeping the horses of a colliery.

It is not, however, the author observes, to be understood that a preference should be given to the feeding of horses with broken or ground corn, instead of potatoes or carrots, which judicious application of these roots is now becoming very general; nothing farther being meant by the above statement, than, that those who may prefer the use of grain should be made acquainted with the best and most economical manner of giving it. This is also equally applicable in the feeding of horses and other cattle on malted corn.

The use of malted instead of raw grain is probably the most judicious way of feeding horses and other cattle. Malted corn, says the same author, tends to open the body and cleanse the intestines, without injury to the health of the animal.

On the principle of a greater utility being derived from substances employed in feeding animals, from their being cut or bruised, as suggested above, Mr. Lawton has lately proposed in a very ingenious Essay the mixing of different kinds of mixed and compressed fodders; a method which he thinks will be found

highly beneficial for horses as well as other cattle when it becomes in general use. By employing cut and compressed food, he supposes that racks will be nearly abolished in the stables, especially where many heavy horses are kept for the purpose of labour either in the cart or field. By adopting this plan in the feeding of animals, a saving in the consumption of the ordinary food of full one-eighth part will be made, as well as a material advantage arise from the facility of using many coarse kinds of herbage mixed in this way with the common food, such for instance, as the haulm of pease, beans, and potatoes, the tops of carrots, &c. and the young branches of fir-trees, &c. By this means, he therefore imagines that the quantity of cattle herbage may be increased in a very extensive manner.

The Comparative Utility of Horses and Oxen in Husbandry.—This is a matter which has engaged much attention, and which is yet by no means fully determined. Horses are however most generally employed for the purposes of agriculture. The reason of this (says Mr. Pitt) seems to be the great superiority of horses as to dispatch, and with which a less number of servants will do the same business, than can possibly be done with oxen. This, he thinks, is not theory, but the result of experience.

Mr. Kent, however, tells us in his Survey of Norfolk, that if it be a fact, which cannot be disproved, that oxen, in some sort of work, are equal to horses, in these cases they certainly ought to be preferred, because they are kept at considerably less expence, and less casualty attends them. It would evidently be very much for the advantage of this country, if oxen were in higher estimation than they are: upon every farm where three teams are kept, one of them, he thinks, ought to be an ox team; for though oxen would not, perhaps, entirely answer the end, to the total exclusion of horses; there is undoubtedly a great deal of work that they would do as well, particularly in carting and all heavy work. In most instances, they are nearly equal to horses, and, in their support, they are full thirty per cent. cheaper. At present no farmers use them in Norfolk; but Mr. Coke, Mr. Colhoun, and some few other gentlemen, occasionally do; and possibly their example, ere long, will be followed by the farmers in general. It was with infinite satisfaction, says he, that I some time since learned, that Lord Hawke, whose experiments in husbandry are very extensive in Yorkshire, has there set an example of ploughing with two oxen to a plough only, which is attended with complete success, as they plough nearly as much as an equal number of horses; and if the cheapness of their keep, and other circumstances in their favour, are considered, they are certainly preferable to horses. There is, in that country, a strong prejudice against this generous animal, which is the first thing to get over: when that can be removed, the credit of the ox will soon follow. The principal advantage which the farmer would derive from oxen, is in the moderate expence of their keep, and in their being attended with less risk. The best way is, however, not to over-work them; for in that case, they will require rather more hay than a horse, and half as much corn; and if they are suffered to fall into low condition, it will require considerable expence and time to get them up again.

The plan found to answer best he describes thus: Suppose four were called a team, which, in this county, would be enough, and that one man was appointed to attend them; I would advise six, instead of four, to be the team, as one man might attend them at the same expence as four; but I would only work four of them at a time, and let two of them rest two days out of the six; by which means they would, in fact, work only four days out of the seven. In the summer months they should have a leasow or pasture to run in, where there is plenty of water and an open shed, where they should have a bait, the day they were worked, of green vetches, cut grass, or any thing the farm might furnish. In the winter, they should be kept in

a yard, with the same sort of shed for them to run into at pleasure; and here they should have plenty of barley or oat straw, and offal turnips, and in the days of working, cut hay and straw, mixed in equal proportions, instead of straw, and turnips besides. In this manner they will in general do extremely well, and will at all events earn as much as the value of their keep; so that their work will be had for nothing. Another great advantage is, that in case of falling lame, there is no diminution by that means in their value, for if their shoulders do not return a profit their ribs will; but if a horse falls lame, at least half his value is lost. So far, says he, we shew the advantage of the ox to his employer—but to the public the advantage is superlatively striking. The ox, when labouring, does not consume so much corn as the horse, for, according to my plan, he would not consume any; and when his labour is done, his body goes to the nourishment of men; but the body of the other is good for nothing but to feed dogs. The more the number of horses can be lessened, the better for all ranks of people. The consumption by horses, especially horses of pleasure and luxury, is astonishing; for though a horse, in agriculture, does not consume above three acres of the fruits of the earth in a year, a horse kept upon the road eats yearly, in hay and oats, the full produce of five acres of land;—man, allowing him a pound of bread, and a pound of meat a day, or in that proportion, not quite an acre and a quarter; and as the poor eat but very little meat, it cannot be put at more than an acre to them: so that one of those horses eats nearly as much as five men. The more, therefore, we reduce our number of horses, the more plentiful will be the fruits of the earth for man.

On this subject, however, a Norfolk farmer thinks somewhat differently. He is of opinion that horses are preferable to oxen, and would use them even in farming in Scotland. Horses can do all the work of a farmer of every description, which oxen cannot, at least to the same advantage. For instance, all kinds of land, at certain times, is the better for quick harrowing, to make it ready for sowing grain; the strong lands to break the clods, and the light land to separate the mould from the weeds, which prevents their vegetation. But with oxen you cannot harrow quickly: besides, it is often necessary to travel quickly with empty carts in harvest time; to expedite the business of a farm, or to carry grain to a distant market for sale, or to send for manure, so as to have but one day's journey. On all such occasions horses are preferable; and on an average it may be stated, that two good horses will do as much work to a farmer as four good oxen.

The observations of Mr. Henry Harper, an excellent Lancashire farmer, also merit attention. "I am no advocate (says he) for horses in preference to oxen; but prefer that mode in which business can be done with most ease and least expence.

"I have on my farm some strong heavy land as any in the kingdom, and some as light. Three horses, with the allowance of two bushels of oats per week each horse, are able to plough an acre a day in the heaviest and strongest land (if ever broke up before), and plough it to any depth from four to eight inches at a proper season of the year. When a second ploughing is necessary, two horses will be sufficient to plough one acre and a half per day in the spring or summer months, and by which there is a spare horse for harrowing in the seed, or any other extra work. I plough single, or the horses abreast, as suits the nature of my work the best.

"The average work done upon the heavy and light soils on my farm with a three-horse team, is seven statute acres per week the year through, which, at 7 shillings per acre, is 49 shillings per week, and have a spare horse eight weeks in the year out of this team. My ploughs are the common swing ploughs with cast-iron mould-boards, of different degrees of

strength, according to the nature of their work and land under tillage. Single or double wheels may be used with these ploughs, as occasion requires, and drawn by a chain fixed to the axis of the plough.

“The calculation of the first purchase, and keep of three horses for one year, is this :

	£.	s.	d.
Three horses, at 25 <i>l.</i> each	75	0	0
Harnes for ditto, at 4 <i>l.</i> 4 <i>s.</i> each	12	12	0
Oats, at 6 bushels per week, for 6 months	19	10	0
Oats, at 3 bushels per week, for 6 months	9	15	0
May for six months, at 1 <i>l.</i> 1 <i>s.</i>	27	6	0
Grass and green crops for six months, at 15 <i>s.</i> per week	19	10	0
Wear and tear of two ploughs, per annum	3	3	0
Wear and tear of horse gear, per annum	1	5	0
Horse-shoeing, at 10 <i>s.</i> 6 <i>d.</i> each horse	1	11	6
Farrier	0	15	0
	170	7	6
Prime-cost, &c. of ox-team,	147	0	0
In favour of the ox-team, balance	£.23	7	6
My horse-team will earn 49 <i>s.</i> per week per annum	127	8	0
Profit on two young horses each per annum, besides eight weeks rest for one horse, or any extra work	2	0	0
	129	8	0
The ox-team will earn 30 <i>s.</i> per week for nine months	£.54	0	0
Profit on the oxen	8	0	0
	62	0	0
	67	8	0
Balance in favour of the ox, first purchase	23	7	6
Neat balance in favour of the horse per ann.	£.44	0	6

“The above statement is what a horse team will do on my farm, and I think may be done upon any farm in England, where they have proper implements and properly applied.”

Mr. Boys observes, that the Weald is the only part of the county of Kent where oxen are generally used for draught. Here it is common to see horses and oxen together, both in the plough and on the roads; eight or ten oxen, with a horse or two before, to lead them along: frequently ten oxen, without any horse, are seen drawing a plough; which he thinks would be much more expeditiously done by four horses. An acre a day is the common yoke for eight or ten oxen in wet, heavy land, where four horses would plough an acre and a quarter. On farms having a greater portion of rich meadow than arable, it perhaps may be proper to employ oxen as beasts of draught, because they are in a growing state, and increasing in their value to fatten; and because they are fed at a small expence on good pasture-land: but on farms not having a greater portion of pasture than arable, and that pasture not being rich good land, the expence of supporting the requisite number of oxen exceeds the expence of supporting the requisite number of horses. There is besides another disadvantage attending the use of oxen: the slowness of their pace is apt to lead the ploughmen into slothful habits, which are seldom got rid of. By some it is contended, that oxen are so valuable to fatten when they have worked for five or six years, that, on that account only, they ought to be more used as beasts of draught: but it should be recollected,

that horses, when they have worked the same time, are more valuable than oxen, because they will then sell for more money, and will work eight or ten years longer; during which time they will earn by their labour perhaps double the value of a lean ox at nine years of age; and therefore the value of an ox, after working five or six years, is not a sufficient argument to recommend them for general use. When horses have laboured a great many years, as a great many do, they owe their masters and the public nothing: and therefore they ought not to be condemned as beasts of draught, in favour of oxen, when their labour is done, and because they are only fit for the hounds. In short, neither of these animals is to be generally recommended in preference to the other. Nature has provided situations best adapted for each of them.

Breeding Cattle.—It is a fact at present very well known, that the breeding of cattle is highly advantageous to the farmer. It must not however be supposed, that in order to derive advantage from cattle, it is alone sufficient to have a great number, and to give them the necessary fodder: there are many other circumstances to be attended to, without which it will be in vain to expect much profit from them. They are frequently kept in too narrow cow-houses, whence many inconveniences arise. Besides being liable to hurt one another in these cases, the most voracious starve their neighbours, from whom they carry off all the fodder within their reach; and the injured cows insensibly decay, become languid, or give little milk. In summer the heat incommodes them; a circumstance which makes them grow lean, and diminishes the quantity of their milk. Care must therefore be taken that they have sufficient room in their stalls; that they be cool in summer and warm in winter. At all seasons they should be kept dry, for that is a material point. Even in summer, wet is disagreeable to them, and in winter it chills them. To prevent this double inconvenience, it will be proper to pave the cow-houses on a gentle descent, and to dig a pit to collect all water and stale. By this means the cattle will lie always dry, and the stale be collected for many useful purposes.

The principles of improvement in breeding cattle in the midland counties, where much attention is paid to the business, as detailed by Mr. Marshall, are the following: The most general principle is beauty of form; a principle which has been applied in common to the different species. It is observable, however, that this principle was more closely attended to at the outset of improvement (under an idea, in some degree falsely grounded, that beauty of form and utility are inseparable) than at present, when men who have been long conversant in practice, make a distinction between a useful sort and a sort which is merely handsome.

The next principle attended to is a proportion of parts, or what may be called utility of form, abstractedly considered from the beauty of form: thus, of the three edible species, the parts which are deemed of use, or which bear an inferior price at market, should be small in proportion to the better parts. This principle, however, appears to have been differently attended to in different species; and will require to be examined, in taking the separate views of each species.

A third principle of improvement, which has engaged the attention of the midland breeders, is the texture of the muscular parts, or what is termed flesh; a quality of live stock, which, familiar as it may long have been to the butcher and the consumer, has not, perhaps, been attended to by breeders, whatever it may have been by graziers, until of late years in this district; where the flesh is now spoken of with the same familiarity as the hide or the fleece; and where it is clearly understood, that the grain of the meat depends wholly on the breed, not, as has been heretofore considered, on the size of the animal.

It appears however, in the practice of Yorkshire, of late years, that circumstances led the breeders of that country to pay some attention to the flesh of cattle; and he has been informed by a gentleman conversant in the Herefordshire breed of cattle, that similar circumstances took place, and probably about the same time, in that quarter of the island.

But the principle which at present engrosses the greatest share of attention, and which, above all others, is entitled to the grazier's attention, is fat, or rather the fattening quality: that is, a natural propensity to acquire a state of fatness at an early age, and, when at full keep, in a short space of time: another quality which is found to be hereditary, or depending, in some considerable degree at least, on breed, or what is technically termed blood; namely, on the specific quality of the parents.

Thus it appears, that the midland breeders rest every thing on breed; under a conviction, that the beauty and utility of form, the quality of flesh, and its propensity to fatness, are, in the offspring, the natural consequence of similar qualities in the parents: and, what is extremely interesting, it is evident from observation that these four qualities are compatible, being frequently found united, in a remarkable manner, in the same individuals.

Without admitting, or endeavouring to confute, in this place, that the four qualities here explained are the only ones necessary to the perfection of the several species of live-stock now under review, we pass on to the means whereby those principles have been applied, in attaining the degree of perfection at present observable in the district under survey.

The means of improvement, in the established practice of the kingdom at large, are those of selecting females from the native stock of the country, and crossing with males of an alien breed; under an opinion, which has been universally received, that continuing to breed from the same line of parentage tends to weaken the breed.

Rooted, however, as this opinion has been, and universally as that practice has prevailed, there is little doubt of the fact, that the superior breeds of stock of this district have been raised by a practice directly contrary; that of breeding, not from the same line only, but the same family: a practice which has now been so long established, as to have acquired a technical phrase to express it. Breeding *in-and-in* is as familiar in the conversation of midland breeders, as *crossing* is in that of other districts. The sire and the daughter, the son and the mother, the brother and the sister, are, in the ordinary practice of superior breeders, now permitted to improve their own kind; and through the assistance of this practice, the bold leader of these improvements evidently produced his celebrated stock.

The argument held out in its favour is, that there can be only one best breed; and if this be crossed, it must necessarily be with an inferior breed; the necessary consequence of which must be an adulteration, not an improvement.

How far this novel practice may, in a general light, be considered as superiorly eligible, would be improper to be discussed in this place. To this intent, it must be understood, that although much has probably been done by breeding *in-and-in*, much also has been done by crossing; not, however, by a mixture of alien breeds, but by uniting the superior branches of the same breed.

The degree of excellency obtained, however, through these means, is not more remarkable than the rapidity with which the improvement of the several breeds has been carried on and extended, not over this district only, but to various parts of the island.

But these circumstances likewise have arisen principally out of a mere point of practice, which, though not peculiar to this

district, is no where, he believes, equally prevalent (except in Lincolnshire), and enters not, in any degree, into the practice of the island at large, in which breeders of every class rear or purchase their male stock.

Here, on the contrary, breeders mostly hire them by the season, of a few leading men in the line of breeding males for the purpose, returning them at the end of the season to their respective owners, who, during the time of letting, have their shows or exhibitions, to which dairy-men, graziers, and stallion-men repair, to choose and hire males for the coming season.

The breed of the midland counties is the long-horned kind.

Feeding and Fattening Cattle.—For the purposes of fattening, cattle are generally bought in the spring, and about Michaelmas. Those which are bought at the former period will be ready for the butcher in the summer, according to circumstances; but those that are purchased at the latter season are either to sell in winter or in spring: they ought to be forward in flesh to be improved the beginning of winter, and kept up during that hard season, either with burnet, hay, turnips, carrots, &c. in order to be fit for a good market whenever it offers; or they may be young lean cattle, which by their growth may pay for their wintering, and be fit to fat the next summer. Some farmers upon ordinary land buy in young Welch heifers, which, if they prove with calf, they sell in spring, with a calf by their side, for the dairy; and those that are not with calf they fatten: all which ways may turn to good account; but most commonly meat is one-third dearer in winter and spring than in summer, as the convenience either of hay, turnips, &c. to fatten cattle with in winter is but in few places.

In the wintering of cattle, it is necessary about September to turn out those you design to keep up for a winter or a spring market, and the cows that give milk, into rough pastures, till either snow or a hard frost comes on, as by that means they will need no fodder: but when either snow or frost comes, hay must be given to such cows as are near calving, or those that have lately calved, or that give a great deal of milk, and also to your fattening cattle. This must be done every morning and evening, in proportion to the quantity of rough grass, &c. that there may be upon the ground. But for the lean cattle, those that give but little milk, straw will do well enough to fodder them with; only you must observe to give barley-straw first, and the oat-straw last, except you value your milk: if you do, give such cows your oat-straw, provided the quantity of milk they give do not deserve hay, or hay be scarce; for barley-straw will take away the milk they have, though it is good food for dry cattle. When hay and carrots fail, scalded malt-dust and grains are frequently given to cows in winter, which makes them give a great deal of milk; the latter is, however, apt to rot them, if given in too great quantities, and continued too long.

When the pastures are eaten up, the milch-cows must be housed, and hay be given them in the cow-house, and to the other cattle in the yard; for which purpose two yards are necessary; one for the cattle which eat straw; with racks and other conveniences to fodder them in. They should be fed often, and not have too much at a time. The yards ought to be well sheltered, and made as dry as possible, and a good deal of straw given them to lie dry and warm in; which is equally advantageous to the cattle and the increase of dung.

For the feeding off land, beasts and horses may be introduced together, or beasts first, and horses afterwards; and after both, sheep. But the grass should not be too rank before it be fed.

Cattle are frequently fed in winter with rye straw, mixed with a little hay; with the straw or haulm of buck-wheat; with the leaves of white beet; with turnips, the turnip-cab-

bage, carrots, cabbages, burnet, and the bruised tops of furze, &c. as has been already mentioned.

All fattening cattle, whether lambs, sheep, barren cows, or oxen, require a proportionable progression from coarser to better food, as they grow more and more into good flesh; otherwise when half fat they will go back, and are with great difficulty raised again, which is obviously a great loss to the farmer.

Farmers in some parts of the country are in the habit of fattening oxen, and other cattle, in stalls, on potatoes and hay, or straw; others on turnips and cabbages, and hay or straw; and likewise on oil-cake and hay. By these means the cattle are frequently made very fat: but it is generally observed by the most experienced men, that this system is not profitable, the chief advantage being that of raising a supply of good manure for the arable lands: a consideration which by some is not thought to be of sufficient importance to pay for the risk and trouble of attending stall-fed oxen. This practice therefore seems to be on the decline.

Cattle when fed with cabbages dung more, and make less urine, than when fed with turnips, and drink little water, which seems to prove that they are a better food for them than turnips. All cattle fed in this manner should have about seven pounds of hay a day allowed to each.

In Kent, some graziers buy Welch calves in the autumn, put them out to keep in farm-yards for the winter, and in the spring place them among their sheep, where they get fat in a few months, and weigh from eighteen to twenty-two score each.

The cattle which are fatted in Wiltshire consist chiefly of long-horned cows, turned off from the dairies, and of oxen brought from different counties, particularly from Devonshire. They are usually bought in very early in the spring, so as, if possible, to be finished with grass; but the largest and latest are taken into the stalls, and finished with dry meat, chiefly hay. Corn is but little in use for fattening cattle in this district; of late, potatoes have been introduced for winter fattening, dressed with steam, and mixed with cut hay or straw, and found to answer very well.

Mr. Pitt, in his Survey of Staffordshire, observes, that all good stock must be both bred with attention and well fed; and perhaps it is necessary that these two essentials in this species of improvement should always accompany each other; for without good resources for keeping, it would be in vain to attempt supporting a capital stock, and with such resources it would be absurd not to aim at a breed somewhat decent in quality. He coincides in opinion with Mr. Miller, that gentlemen of fortune should procure, for the use of their tenants, the best bulls, rams, stallions, &c. This, says he, if they did not choose to do *gratis*, might easily be thrown upon a plan to indemnify expences, and would tend very much to facilitate the improvement of the stock of the smaller farmers. The great object in the produce from horned cattle being, first, milk; second, beef; the uniting of these two products in the greatest quantity from the least food or produce of land, seems the ultimatum of breed. It has often been observed, that cows with the best disposition to fatten, not only give the least milk, but soonest go off their milking; whilst a loose, open, ill-made cow will both give a larger quantity, and continue it longer; but it is not so easily fatted, nor without much more time: the uniting of these two qualities in the highest degree is therefore the true desideratum of breeding.

The cow-stock of Mr. Princep, an excellent Derbyshire breeder, is of the long horned breed, and by long attention have been brought to a very high degree of superiority; large, thick, heavy, and well-made, with a pretty good show for milking, and such a disposition to fatten, that he says the young stock are obliged to be almost starved by short pasturage,

otherwise they run fat and never stand the bull: the cows give upon the average about eight quarts of milk each, a day, which the owner thinks equal, from its superior quality, to a much greater quantity from inferior breeds.

A Norfolk farmer says, that from all the experience he has had, he prefers the Argyll or west Highland breeds of cattle. He considers them to be the most profitable cattle in Great Britain, for fattening. If bought at about four years old, they both grow in size, and fatten at the same time, and make a very quick return of profit. They are horned, generally black, and weigh, when fattened, about 560lb. or 40 stone, at 14lb. to the stone (16 ounces to the pound). That medium size is always sure to fetch the best price at market.

And Sir John Clerk, whose attention to rural improvements is well known, is decidedly of opinion, that the Galloway breed is by far the best species of cattle for the greatest part, if not of Scotland in general. The Highland cattle are certainly excellent, both in regard to shape and hardiness; but they are of so wild a nature, and so untameable, that they cannot be fattened half so quickly. Poll'd animals, of every species, are always of a tamer and more quiet disposition than the horned, and consequently are more easily fattened, and at less expence. Poll'd cattle, it is well known, are also much better calculated for working, and for being driven in droves, or great numbers at once; and it is well known, that no sort of cattle sell better in England than the Galloway.

In Lancashire, Mr. Holt remarks, that amongst the cow-keepers all varieties are found: they change so frequently, that when a cow, likely to be useful, and at the point of dropping calf, is brought to the market, they purchase it, without paying much regard either to the species or country. Some farmers have introduced upon their farms the Suffolk polls; and they have been found to stand the climate, although they have a thin skin and fine coat; and they have, upon proof, been found to answer so well in milking, that frequent applications have been made for the purchase of them. These stock seem well calculated for the spongy soft lands, being lighter upon the surface than the long-horn. But others have hitherto preferred the Holderness. But the long-horn of the true Lancashire breed is the prevailing stock, and seems in general well adapted to the soil; doing less damage to the clay lands than the heavy Holderness, and being much esteemed by the feeder and butcher for their carcase. Mr. Orme of Derbyshire tried nine Holderness cows against nine Derbyshire cows of the improved sort: the former gave the greatest quantity of milk, but that of the latter was considerably more productive of butter and cheese. By the improved Derbyshire cow is meant such as was bred by crosses from the Lancashire, Warwickshire, &c. and what the Leicestershire breeders and others call the old-fashioned sort, before delicacy of flesh, and the feeding properties, were so much attended to. This sort of cow is generally the home-bred stock of Derbyshire.

In West Kent, where the dairies are small, the cows are home-bred, between those of Staffordshire, Wales, and Sussex; but some of them, which consist not of more than three or four cows, have the Welch sort only.

Lately indeed some cows have been brought from the islands of Alderney and Guernsey, for the use of the dairies of gentlemen's families. These are a small ill-made kind of cattle, but remarkable for giving milk of a very rich quality, which yields a greater portion of cream, and makes more butter from a given quantity than that of any other kind of cattle: the butter too is of a beautiful yellow colour, and highly esteemed for its fine flavour. Whether, however, these kinds of cows will preserve their superiority in this respect many years, if bred and kept in this country, time only can discover; but it is most probable, that soil and climate will operate in the course of

time, so that there will be no perceptible difference in the quality of the cream and butter between these and common English cows.

Mr. Robertson, in his able Survey of Mid Lothian, says, he has found good and bad milch-cows of all different shapes, sizes, and complexions, without a single circumstance to discriminate them, but one only, and even that not uniformly certain, which is the size of the neck, as all good milkers in general have the neck small. I have, continues he, just now two, that in every circumstance, of colour, height, and shape, are as unlike to one another as a bull-dog is to a spaniel; but yet in respect to milk and butter, they are similar to a fraction; having frequently caused their milk to be measured, kept separate, and churned each by itself; and have always found the same quantity in both, viz. from 8 to 12 Scotch pints of milk, and from 20 to 24 ounces of butter in the day. They are very large, and have a reserve of the best grafs to themselves. From their size, they require a longer time to get fat than the smaller sorts: they usually weigh from forty-five to seventy score each.

In the Survey of Wiltshire, it is observed, that many attempts have been made lately to supplant the long-horned cows, by introducing the Devonshire kind into this district. The comparative merits of the two species are very warmly contested: the Devonshire cow, undoubtedly, gets ripe at an earlier age than the long-horned cow, and, being a smaller animal, is less liable to tread and poach out the wet lands; and being disposed to get fat at an early age, and when fat of a greater comparative value to the butcher than almost any other kind, is much better calculated than the long-horned cow, for those who breed for the purpose of fattening.

How far these properties, particularly that remarkable disposition to get fat at an early age, may answer the general purpose of a dairy, where milk alone is required, remains to be proved. It is possible, that each of the two kinds of cows may be most proper for the particular purposes for which they are kept. But the supporters of the Devonshire cows say, that they are equally good milkers with the long-horned species; and yet, that they are so much smaller, and eat so much less food, that three of these may be kept on the same land as will keep two long-horned cows. If this can be proved, the question is decided at once.

Thus there seems an increasing opinion of the merits of the Devonshire kind; and, perhaps, if half so much care and attention had been paid to the breed of the Devonshire cows, as has been bestowed on the long-horned kind, it is probable that the former might have been still more improved, and that the comparison might have been much more in their favour. Whatever may be the real comparative merits of the two kinds of cows for the dairy, there is not a doubt but the Devonshire kind are the most proper for fattening; and as to the oxen bred from the two kinds, it would be injustice to the Devonshire oxen, even to make a comparison between them.

The ingenious Doctor Anderson seems to think it probable, that in feeding of cattle, the progress which they make will be nearly in proportion to the quantity of nourishing food that they can be induced to take, above that which is necessary merely for their support. But, says he, I know of no fact that has been yet brought forward, which clearly ascertains whether the degree of melioration is exactly in proportion to the *surplus* food of any sort that an animal can be brought to eat in a given time, though the probabilities are greatly on that side. Neither do I know if it be an universal rule, when animals of *different kinds* are compared with each other, that those kinds which can be made to eat, in a given time, the greatest quantity of food, can be the soonest fattened.

The same author also thinks, that *condiments* might be employed in feeding animals, with great advantage. In the fat-

tening of calves, some attention has been paid to this matter. I have met, says the above author, with few persons who have had an extensive practice in this department, who are not sensible that the profit is in proportion to the quantity of milk that the creatures can be induced voluntarily to take in a given time. The vast importance of studying the taste of the creatures they feed has, he observes, been seen by many, that they may not only furnish them with the kinds of food they like best, but also to vary these from time to time, and to give them exactly in the quantities, and in the way that they find will induce the creatures to eat the most. In this branch of rural economics, continues he, I have met with no person who has made greater progress than a plain practical farmer at Hope, in the neighbourhood of Manchester, who spares no trouble or expence in procuring such kinds of food and condiments as he finds best calculated to induce his cows to consume, in a given time, the greatest quantity of food possible. The consequence is, that this man makes much money, where his neighbours, who are not in the secret, and more niggard in their outlay than he is, sustain a loss. Among other condiments, this man has discovered, that pure water stands pretty high in the scale; on which account his beasts are never suffered, far less obliged, to taste a drop of water that has ever been sullied by any animal setting a foot into it. With this view, they are always served with running water, which is, for their convenience, received into a long wooden trough, through which it passes while they are drinking.

Common salt may also be used with advantage in the way of condiment. There is no substance yet known, says the same author, which is so much relished by the whole order of *graminivorous* animals as common salt. It has been found by those who have made the experiment, that salt given along with the food of domestic animals (except fowls, to which it is a poison) tends very much to promote their health and accelerate their feeding. The way in which this substance is supposed by the author to produce its beneficial effects, is by acting as a condiment, thereby whetting the appetite, and giving the creature to which it is properly administered, a strong relish for its proper food, so as to induce it to eat a greater quantity than it otherwise would have done in a given time, and thus greatly augmenting, as has been just explained, its feeding quality beyond what it otherwise could have had. In this way, the same author thinks, it is not an extravagant position to say, that by a proper use of common salt, the same quantity of forage might, on many occasions, be made to go twice as far as it could have gone in feeding animals, had the salt been withheld from them.

We must however observe, that the salt laws as they stand at present operate very much against any improvement in fattening animals on this plan.

For *fattening* of cattle, *hay* should be of the very best quality, as one stone of hay of an exceeding fine quality will go as far in *feeding* beasts, as four of an inferior quality. Indeed no hay but that of the best quality will fatten beasts at all. But for this purpose, the Doctor says, it may frequently be necessary to mix the *hay* with grafs; but for rearing young beasts, or other purposes, it will be highly economical to make use of straw for this purpose; for straw of oats or barley, when thus mixed with grafs, will be equally good as ordinary hay. If economy were duly studied by farmers, perhaps not one particle of those kinds of straw should ever be employed in any other way. Nor could the possessor of *corn* farms ever be at a loss for making such an intermixture, as he will find it profitable always to have as much ground under clover, as would be sufficient thus to mix the whole of his straw, if he were inclined.

Mr. Henry Harper's *Method of feeding Cows* is deserving of the attention of those who are engaged in dairying. There are,

says he, seasons in which it is so very difficult to make good hay, that much will be damaged although the greatest attention be paid; the consequence of which is, the milk given by the same cows is less in quantity, and of inferior quality; the butter both loses its natural colour and good flavour; to remedy which, this ingenious farmer takes the following method: He provides some sort of provender for his cows; that is, some species of ground grain; and to mix with it, he procures some hay of the best quality, and from the most fertile lands, which he treats in the following manner: This rich hay is to be used as an ingredient for tea, by pouring boiling water upon it; and the infusion he makes use of to scald his ground grain, chopping the hay, before it is infused, with an engine designed for the purpose of cutting straw; and this hay, so cut to the size of one inch long, is to be mixed with scalded provender, to the amount of two or three quarts to every beast. This mixture of bruised grain, scalded with the infusion of rich hay, and the addition of the hay to the amount of two or three quarts to each beast, improves the flavour of the butter, and restores it to its proper yellow colour.

The same attentive farmer made the subsequent trial, which we shall give in his own words: "I had, says he, one year six cows that I house-fed, all at one time, and nearly all of an age; and by way of experiment, I fed two with turnips and ground corn; and two with boiled potatoes and ground corn; and two with raw potatoes and boiled corn: they were all put to feed at one time; and when I thought them fit for the market, I sold three, one from every lot, and went to see them dressed. In those two fed with ground corn and turnips, and ground corn and boiled potatoes, there was little or no difference; but that which was fed with raw potatoes and boiled corn, was better in flesh, and more fat within side, than the other two, by a fortnight's keep; and this was not only my opinion, but the butcher's who killed them: the other three I kept three weeks longer; and when killed, they were proportionably nearly in the same state with the others, but better by being kept the longer: so I prefer boiled corn to any sort of grain, and think it more forcing, either for milk or feeding. They had all one and the same quantity of corn, &c."

Boiling corn has been practised by some others, with good success. A little linseed improves the quality. Hay seeds, that drop out of the hay, should be carefully preserved, and worked up in mixtures of potatoes or oats, either scalded or boiled. Mr. Holt has experienced the good effects of hay seeds upon his cattle, for many years. An ingenious farmer, lately talking upon this subject, observed, that the seeds of many weeds might be converted to good use; and spoke with confidence of the feeding quality of some of them.

Instead of oil-cake, the linseed boiled, and instead of spent grains from the breweries, barley boiled and mixed together, with the addition of chopped straw, hay-seeds or chaff, have been tried by Mr. J. Balmer, both upon milch and feeding cattle; and with more profit than with either of the residuums.

On the cow management of Lancashire Mr. Holt observes, that those who are supposed to follow the best system, with a proper capital, seldom keep the same cow more than one calf, except some particular favourite. They are purchased at the time of calving, and the calf is immediately sold to feeders for the market, and who keep cows for that purpose, and dispose of their milk, and procure a livelihood that way. The cows, when they fail of yielding a certain quantity of milk (about six quarts per day), are, if in proper condition, disposed of to the butcher: and, if properly kept, to advantage, *i. e.* for more than the first cost.

Some, who regularly change their cows, do it however frequently at the loss of two guineas per head. A cow at drop-

ping calf is generally worth, *cæteris paribus*, two guineas more to the cow-keeper than she would be to the butcher.—If she can be sold after nine months milk, for the first cost, or any advance, it must depend upon the beast being well bought, the season of the year when sold, or extra keep to promote feed.

By Mr. Henry Harper we have also the following statement of the expence of keeping, and produce, of a cow per ann. averaged out of a flock of twenty-five cows, kept upon his farm.—The sales of produce, and expence of keep, are estimated according to the price of the different articles in 1794.

Average butter of one cow for 52 weeks is			
4lb. per week; 208 lb. of butter, at	£.	s.	d.
11d. per lb.	-	-	9 10 8
Milk of all kinds, 52 weeks, at 3s. 3d.	-	-	8 9 0
Price of calf	-	-	0 4 0
Three tons manure, at 4s. 6d.	-	-	0 13 6
Cartage saved, by the dung on the premises	-	-	0 7 6
			<hr/> 19 4 2
Expence of grafs for the summer	-	2	5 0
Hay, 160 stone, at 8½d.	-	5	13 4
Provender, 26 weeks, at 3s. 6d.	-	4	11 0
After-grafs or eddish	-	1	10 0
Loss in cattle 5 per cent. 9s. per head	-	0	9 0
Cart-horse and keep (to carry the produce to market)	-	0	2 6
Dairy-maid	-	1	0 0
Attendance to milk	-	1	2 6
Wear and tear, mugs, &c.	-	0	1 6
Salt for 208 lb. butter, 16 lb.	-	0	1 9
			<hr/> 16 16 7
Profit per ann.	-	£2	7 7

The provender, to which the above statement alludes, consists of two feeds, morning and evening, each day, half a peck of potatoes or turnips cut and given raw, value one penny halfpenny; one pint of oats and one pint of barley mixed together, and boiled with chaff, cut straw, bran, or malt-dust, mixed with the potatoe or turnip, value one penny halfpenny, or three pence each meal. The corn is boiled in plenty of water till it bursts, and the water is used in the mixture.

The average milk of the flock of this farmer is seven quarts of milk per day the year through; although some prime cows in their full perfection, and in the height of grafs, may yield when fresh calved eighteen, twenty-four, or even thirty quarts of milk in a day; but this superabundance is but of short duration.—From every twelve quarts of milk is produced one pound of butter, of 18 ounces to the pound.

On the advantages of feeding milch-cows in the house, in preference to keeping them out of doors, Baron d'Alten, an intelligent Hanoverian nobleman, has communicated some observations to the Board of Agriculture, from which the following are extracted.

He remarks, that milch-cows are infinitely more profitable, kept in the house than out of doors; but they must be early trained to it, otherwise they do not thrive. The best kinds of food for them are clover, lucerne, potatoes or yams, turnips, carrots, honey grafs (a German grafs not known in England), cabbages, pease and beans. Such cows as those in the neighbourhood of London, kept in the house, and properly fed, ought to yield nine gallons per day, for the first four months after calving. Afterwards the quantity will become less and less. But on the supposition that such cows yield, at an average, only 6 gallons for 9 months, or 252 days, that at 6d. per gallon produces 3s. per day, or in 9 months, 37l. 10s.

If, from any circumstance, the milk cannot be sold fresh, the profit will be much less, but is still very considerable. Each 5 gallons of milk should produce a pound of butter. Hence, in all, 302lb. worth, at 1s. per pound, 15l. 2s. The butter-milk, for the purpose of fattening swine, should be worth 7l. 11s. Total 22l. 13s. An English acre of a middling soil should produce 20,000lb. weight of green, or 5000lb. of dry clover. A large cow requires 110lb. of green, and 27½ lb. of dry clover per day; consequently in 365 days 40,150lb. or a trifle more than the produce of two acres. Whereas the same cow, fed entirely out of doors, summer and winter, would require the pasture of four acres, the ground would be injured by being poached by their feet, the grass hurt by being bruised instead of cut, and the manure would not be half so useful. According to the first calculation, each acre should produce in milk 18l. 18s.; and by the second, (in butter and butter-milk) 11l. 6s. 6d. besides the value of the manure. It has been found, that carrying cattle, fed within doors, and keeping them as cleanly as horses in a stable, is attended with the best consequences, both in regard to the milk they yield, and the rapid improvement of the carcase.

Management of the Dairy.—This is a matter of considerable nicety and importance, and with which every one engaged in this branch of husbandry should be well acquainted, as considerable advantages may be made by a judicious management of the different processes.

Butter.—Where the object of the farmer is the making of butter, Doctor Anderson observes, that it is necessary to choose cows of a proper sort. Among this class of animals, says he, it is found by experience, that some kinds give milk of a much thicker consistence, and richer quality, than others; nor is this richness of *quality* necessarily connected with the smallness of the *quantity* yielded by cows of nearly an equal size; it therefore behoves the owner of a dairy to be peculiarly attentive to this circumstance. In judging of the value of a cow, it ought rather to be the quantity and the quality of the *cream* produced from the milk of a cow in a given time, than the quantity of the milk itself. This is a circumstance that will be shewn by and by to be of more importance than is generally imagined. The small cows of the Alderney-breed afford the richest milk hitherto known; but individual cows in every country may be found, by a careful selection, that afford much thicker milk than others: these therefore ought to be searched for with care, and their breed reared with attention, as being peculiarly valuable.

Few persons who have had any experience at all in the dairy way can be ignorant, however, that in comparing the milk of two cows, to judge of their respective qualities, particular attention must be paid to the time that has elapsed since their calving; for the milk of the same cow is always thinner soon after calving than it is afterwards; as it gradually becomes thicker, though generally less in quantity, in proportion to the time the cow has calved. The colour of the milk, however, soon after calving is richer than it afterwards becomes; but this, especially for the first two weeks, is a faulty colour that ought not to be coveted. In order to make the cows give abundance of milk, and of a good quality, they must at all times have plenty of food. Grass is the best food yet known for this purpose, and that kind of grass which springs up spontaneously on rich dry soils is the best of all. If the temperature of the climate be such as to permit the cows to graze at ease throughout the day, they should be suffered to range on such pastures at freedom; but if the cows are so much incommoded by the heat as to be prevented from eating through the day, they ought in that case to be taken into cool shades for protection, where, after allowing them a proper time to ruminate, they should be supplied with abundance of green food

fresh cut for the purpose, and given to them by hand frequently in small quantities fresh and fresh, so as to induce them to eat it with pleasure. When the heat of the day is over, and they can remain abroad with ease, they may be again turned into the pasture, where they should be allowed to range with freedom all night during the mild weather of summer.

Cows, when abundantly fed, should be milked three times a day during the whole of the summer season, in the morning early, at noon, and in the evening just before night fall. For if they be milked only twice in the day, while they have abundance of succulent food, they will yield a much smaller quantity of milk in the same time than if they be milked three times. In the choice of persons for milking the cows, great caution should be employed; for if that operation be not carefully and properly performed, not only the quantity of the produce of the dairy will be greatly diminished, but its quality also will be very much debased; for if all the milk be not thoroughly drawn from a cow when she is milked, that portion of milk which is left in the udder seems to be gradually absorbed into the system, and nature generates no more than to supply the waste of what has been taken away. If this lessened quantity be not again thoroughly drawn off, it occasions a yet farther diminution of the quantity of milk generated; and so on, it may be made to proceed in perpetual progression from little to less, till none at all is produced. In short, this is the practice in all cases followed, when it is meant to allow a cow's milk to dry up entirely without doing her hurt.

After stating some facts respecting the properties of milk, which seem to be founded on experiment, such as that the first drawn milk is always thinnest, but continues to increase in thickness to the last; that the portion of cream which first rises to the surface of the milk is thicker, of better quality, greater in quantity than that which rises in a second equal length of time; that thick milk throws up a smaller quantity of cream than such as is thinner, but the cream is richer in quality; that milk carried to any distance in vessels, thereby suffering considerable agitation, never throws up so rich or such a quantity of cream as when it is put into the milk pans without any agitation; the same writer draws the following conclusions: 1st. That it is of importance that the cows should be always milked as near the dairy as possible, to prevent the necessity of carrying and cooling the milk before it be put into the dishes; and as cows are much hurt by far-driving, it must be a great advantage in a dairy farm to have the principal grass fields as near the dairy or homestead as possible.

2dly. That the practice of putting the milk of all the cows of a large dairy into one vessel, as it is milked, there to remain till the whole milking be finished before any part of it is put into the milk-pans, seems to be highly injudicious, not only on account of the loss that is sustained by agitation and cooling, but also, more especially, because it prevents the owner of the dairy from distinguishing the good from the bad cow's milk, so as to separate them from each other, where necessary. He may thus have the whole of his dairy product greatly debased by the milk of one bad cow, for years together, without being ever mixed with any other.

3dly. That if it be intended to make butter of a very fine quality, it will be advisable in all cases to keep the milk that is first drawn separate from that which comes last; as it is obvious that, if this be not done, the quality of the butter will be greatly debased, without much augmenting its quantity. It is also obvious, that the quality of the butter will be improved in proportion to the smallness of the proportion of the last-drawn milk that is retained; so that those who wish to be singularly nice in this respect, will do well to retain only a very small proportion of the last drawn milk.

4thly. That if the *quality* of the butter be the chief ob-

just attended to, it will be necessary not only to separate the first from the last drawn milk, but also to take nothing but the cream that is first separated from the best milk, as it is this first rising cream alone that is of the prime quality. The remainder of the milk, which will be still sweet, may be either employed for the purpose of making sweet milk cheeses, or it may be allowed to stand to throw up cream for making butter of an inferior quality, as circumstances may direct.

5thly. That butter of the very best possible quality can only be obtained from a dairy of considerable extent, when judiciously managed; for when only a very small portion of each cow's milk can be set apart for throwing up cream, and when only a very small proportion of that cream can be reserved as of the prime quality, it follows, that, unless the quantity of milk were upon the whole very considerable, the quantity of prime cream produced would be so small as to be scarcely worth the while for manufacturing separately.

6thly. That it seems probable that the very best butter could only be with economy made in those dairies where the manufacture of cheese is the principal object. The reasons are obvious: if only a small portion of the milk should be set apart for butter, all the rest may be made into cheese while it is yet warm from the cow and perfectly sweet; and if only that portion of cream which rises during the first three or four hours after milking is to be reserved for butter, the rich milk which is left after that cream is separated, being still perfectly sweet, may be converted into cheese with as great advantage nearly as the newly-milked milk itself.

But, says the author, as it is not probable that many persons could be found, who would be willing to purchase the very finest butter made in the manner above pointed out, at the price that would be sufficient to indemnify the farmer for his trouble in making it; these hints are thrown out merely to satisfy the curious in what way butter possessing this superior degree of excellence may be obtained, if they choose to be at the expence: but for an ordinary market, he is satisfied, from experience and attentive observation, that if in general about the first drawn *half* of the milk be separated at each milking, and the remainder only be set up for producing cream, and if that milk be allowed to stand to throw up the whole of its cream, even till it begins sensibly to taste sourish; and if that cream be afterwards carefully managed, the butter thus obtained will be of a quality greatly superior to what can usually be obtained at market, and its quantity not considerably less than if the whole of the milk had been treated alike. This, therefore, is the practice that he thinks most likely to suit the frugal farmer, as his butter, though of a superior quality, could be afforded at a price that would always insure it a rapid sale.

Milk-House.—No dairy, however, can be managed with profit, unless a place properly adapted for keeping the milk, and for carrying on the different operations of the dairy, be first provided. The necessary requisites of a good milk-house are, that it be cool in summer, and warm in winter, so as to preserve a temperature nearly the same throughout the whole year; and that it be dry, so as to admit of being kept clean and sweet at all times. This structure ought, if possible, to be erected near to a cool spring or running water, where easy access can be had to it by the cows, and where it is not liable to be incommoded by stagnant water.

And when cheese is the principal object, a building constructed for that purpose is necessary.

The precise degree of heat that is the most favourable for the different operations of the dairy, is not yet determined; but until farther experiments shall have ascertained this point, the author thinks we may take it as a safe rule, that the heat should be kept up, if possible, between the 50th and 55th degree; and to ascertain this point, a thermometer, graduated by

Fahrenheit's scale, should be hung up perpetually in the milk-house, to give notice to the owner of any alterations in the temperature that might affect his interest.

Utensils.—With respect to the utensils of the dairy, they must in general, from the nature of the business, be made of wood. But of late many persons, who affect a superior degree of elegance and neatness, have employed vessels made of lead, or of common earthen-ware. But, as the acid of milk very readily dissolves lead, brass, or copper, and with these forms a compound of a poisonous nature; such vessels must be accounted highly pernicious in the dairy, and therefore ought to be banished from it. The same may be said of vessels of any of the common kinds of earthen ware, which being glazed with lead, and the glazing soluble in acid, are equally improper.

The creaming dishes, or vessels in which the milk is placed for throwing up cream, when properly cleaned, sweet, and cool, are to be filled with the milk as soon after it is drawn from the cow as possible, having been first strained carefully through a close strainer, formed of a large wooden bowl with a hole at the bottom covered with a very close sieve of fine wire (silver wire is best, and most durable and cleanly) or hair web woven for that purpose; or thin cloth of any kind, so as to keep back hairs, &c. that may accidentally fall from the cow. These dishes should never exceed three inches in depth, whatever be their other dimensions; and if the plan recommended above of separating the milk into two parts, and of keeping each cow's milk by itself, shall be followed, it would be convenient to have them made of such dimensions as to contain about one and a half or two gallons. As soon as they are filled they are to be placed on the shelves in the milk-house, where they should be allowed to remain perfectly undisturbed till it be judged expedient to separate the cream from them; which will depend upon the degree of heat at the time, and the particular views of the owner of the dairy. In a moderately warm temperature of the air, if very fine butter be intended, it should not be allowed to stand more than six or eight hours; but for ordinary good butter it may safely be let stand twelve hours, or more.

The cream, being carefully separated, must be deposited by itself in a vessel suitable for the purpose, and kept until a sufficient quantity be collected. A firm neat-made wooden barrel, with a lid fitted to it, is probably as well calculated for this use, as any vessel. Its size must depend on that of the dairy.

The length of time which the cream must remain in this vessel must depend on circumstances; but it should always have acquired a certain degree of acidity, without which it cannot be made into butter with facility. With regard to the operation of churning, it is only necessary to say that it should be carefully performed, whatever kind of churn be employed.

The butter when made must be immediately separated from the milk; and being put into a clean dish (the most convenient shape is that of a shallow bowl), the inside of which, if of wood, should be well rubbed with common salt, to prevent the butter from adhering to it, the butter should be pressed and worked with a flat wooden ladle, or skimming-dish, having a short handle, so as to force out all the milk that was lodged in the cavities of the mass. On this being well performed, much depends with respect to the goodness of the butter. When butter has been thus prepared, it is to be preserved by means of common salt when necessity requires it, and kept from being too soft by means of cold water.

And in every part of the above process it is of the utmost importance that the vessels, and every thing else about the dairy, be kept perfectly clean and sweet; for without this precaution there neither can be pleasure nor profit derived from it.

In Lancashire, according to Mr. Holt, the management of milk for butter, in many respects agrees with the above,

though he suspects it to be peculiar to that district. The mode is, dividing the milk into two parts; the first drawn being set apart for family use, after being skimmed; the cream of which goes into vessels appropriated to receive it; as also the whole of the second, or last, drawn milk, provincially called *afterings*; about one half from each cow, each meal; but the quantity taken first in some measure depends upon the consumption of milk in the family. These two being mixed together, are stirred, but not a great depth, to prevent the bad effects of foul air accumulating on the surface: and kept, according to the season of the year, exposed to the fire, to bring on fermentation and sourness; which is accelerated by that which may remain in the pores of the vessels: to prepare this fermentation, they are not scalded, except after having contracted some taint: and then to accelerate it (the quicker it is the better) the vessels are sometimes rinsed out with sour butter-milk; in which state the milk is ready for the churn; and, in consequence of this treatment, more butter is obtained, and of a better quality, than if the milk was churned sweet. And the butter-milk, as it is called, after the butter is extracted, instead of being given to the hogs, as is generally the practice in many counties, becomes, under this process, an excellent food for man.

In Mr. Robertson's Survey of Mid-Lothian, we have the following observations on this important subject: A gentlewoman in the vicinity of Edinburgh, who has been much accustomed to the management of a dairy, states, that she has always been used to churn the whole milk in a plunge churn, with a *swive* (a lever applied to the end of the churn-staff), which she thinks is much preferable, on account of its greatly facilitating the operation. In warm weather the milk is fit for churning in 48 hours, keeping it from the churn till it is cool; but in cold weather it must be put in warm, to make it thicken sooner; for it is not fit to be churned till it is thick; and in great cold, it is even necessary to set it in a warm place, to promote the coagulation, as the sooner this is accomplished, both the butter and the butter-milk are the better; for when the milk is long kept, it contracts a disagreeable rancid taste; on which account, chiefly, she prefers churning the *whole milk*; for in making butter from *cream*, the milk must be kept long, in order to obtain all the cream from it: but whether churning milk or cream be most profitable, is not yet ascertained in that neighbourhood; though it is held, that the milch-butter is most palatable, at least will keep much longer sweet. In warm weather, cold water is put in during the operation of churning; and in cold weather, boiling water in proportion to the degree; but in temperate weather none at all. It generally takes from one to two hours to churn: but that depends much on the temperature of the milk; for, if it is either too warm or too cold, it requires a longer time.

In the management of his own dairy, Mr. Robertson seems, however, chiefly to have followed the methods which have been recommended by Doctor Anderson, and the quantity of butter which he procures is generally in the proportion of a pound of 22 oz. to every five gallons of milk.

Making Cheese.—In the making of cheese many circumstances are to be attended to; such as the preparation of the rennet, the coagulation of the milk, the management of the curd, &c. These operations are differently conducted in different dairies, and different parts of the country. The following is the method of preparing the rennet, and making cheese, which Mr. Marshall employed:

“Take a calf's bag, maw, or stomach; and, having taken out the curd contained therein, wash it clean, and salt it thoroughly, inside and out, leaving a white coat of salt over every part of it. Put it into an earthen jar, or other vessel, and let it stand three or four days; in which time it will have formed the salt and its own natural juices into a pickle. Take it out of the jar, and hang it up for two or three days to let the pickle drain from it;

refalt it; place it again in a jar; cover it tight down with a paper pierced with a large pin; and in this state let it remain until it be wanted for use. In this state it ought to be kept twelve months: it may however, in case of necessity, be used a few days after it has received the second salting; but it will not be so strong as if kept a longer time.

In preparing this substance for use, it is the custom in some places to mix with it various aromatic and spicy ingredients, such as rose-flowers, cinnamon, mace, &c. but in others this is not at all attended to, yet very good cheese is made.

From the experiments and observations of the same writer it appears, that curd of a good quality may be obtained from milk heated from 87 to 103 degrees of Fahrenheit's thermometer; provided the rennet be so proportioned, that the time of coagulation be from three quarters of an hour to two hours and a half; and provided the milk be kept properly covered during the process of coagulation. From the same trials it also seems, that from 85 to 90 are the proper degrees of heat; that from one to two hours is the proper time of coagulation; and that the milk ought to be covered so as to lose in the process about 5 degrees of its original heat. But climate, seasons, the weather, and the pasture, may, says this writer, require that these bounds should sometimes be broken.

“In my dairy, (continues he) the practice has been uniformly this: As soon as the curd is come at the top, firm enough to discharge its whey, the dairy-woman tucks up her sleeves, plunges her hands to the bottom of the vessel, and, with a wooden dish, stirs the curd and whey briskly about: she then lets go the dish, and, by a circular motion of her hands and arms, violently agitates the whole; carefully breaking every part of the curd; and, at intervals, stirs it hard to the bottom with the dish; so that not a piece of curd remains unbroken larger than a hazel nut. This is done to prevent what is called slip-curd (that is, lumps of curd which have slipped unbroken through the dairy-woman's hands), which, by retaining its whey, does not press uniformly with the other curd, but in a few days (if it happen to be situated toward the rind) turns livid and jelly-like, and soon becomes faulty and rotten. This operation takes about five or ten minutes; or, if the quantity of curd be large, a quarter of an hour. In a few minutes the curd subsides, leaving the whey clear upon the top. The dairy-woman now takes her dish, and lades off the whey into the pail; which she empties into a milk-lead to stand for cream, to be churned for whey butter. This is a practice peculiar to the cheese counties, and forms no inconsiderable part of the profit of a dairy in those counties. Having laved off all the whey she can, without gathering up the small pieces of the loose curd floating near the bottom of the vessel, she spreads a straining-cloth over her cheese tongs, and strains the whey through it, returning the curd retained in the cloth into the cheese-tub. When she has got all the whey she can, by pressing the curd with her hand and the lading-dish, she takes a knife and cuts it into square pieces, about two or three inches square. This lets out more of the whey, and makes the curd handy to be taken up, in order to be broken into the vats.

“A dairy should be plentifully furnished with vats, and some of them of different sizes; for when three or four cheeses are made at each meal, a number of vats become actually in use; and if there are not still a number empty, the dairy-woman becomes confined in her choice, and cannot proportion exactly her vats to the quantity of curd she happens to find in her cheese-tub; and keeping a little overplus curd from meal to meal frequently spoils a whole cheese.

“Having made choice of a vat or vats, proportioned to the quantity of curd, so that the cheese, when fully pressed, shall neither over nor under fill the vat, she spreads a cheese-cloth loosely over the vat; into which she re-breaks the curd; carefully squeezing every part of it in her hands; and, having filled

the vat heaped up and rounded above its top, folds over the cloth, and places it in the prefs.

"Much depends on the construction and power of the prefs. The excellency of construction depends upon its pressing level: if it has too much play, so as to incline and become tottering or leaning one way or another, and do not fall perpendicular upon the cheese-board, one side of a cheese will frequently be thicker than another; and, what is still worse, one side will be thoroughly pressed while the other is left soft and spongy. Its power may be given by a screw, by a lever, or by a dead weight, and ought to be proportioned to the thickness of the cheese.

"In autumn, when the weather got cool and moist, the curd was scalded, to make the cheese come quicker to hand, (that is, sooner saleable) and to prevent a white woolly coat from rising. It is done thus: If from new milk, scalding water (boiling water with a small quantity of cold whey mixed with it) is poured over the whole surface of the curd as it lies at the bottom of the cheese-tub: if from skimmed or other inferior milk, the outsides only are scalded, after the curd is in the vat, by first pouring the scalding water on one side, and then, turning the cheeseling, pouring it on the other. For if in this case the curd were to be scalded, it would render it hard, and spoil the taste and texture of the cheese. In the scalding the cheeseling, the curd is first put into the bare naked vat, and the upper part scalded: the cheese-cloth is then spread over it, and the vat being turned, the curd falls into the cloth: the curd, with the cloth under it, is then put into the vat; the outer edges pared off; the paring broke, and rounded up in the middle; and the scalding water poured upon it as before; the folds of the cloth laid over, and the vat set in the prefs.

"The whey being pretty well pressed out, and the cheeseling (whether it has been scalded or not) having got firm enough to handle, which it will be in about half an hour, the dairy-woman takes it out of the vat; washes the cloth in a pail of clean cold water; spreads it over the vat; turns the cheeseling upon it; squeezes it gently into the vat; folds over the cloth; tucks in the corner with a wooden cheese-knife, and replaces the vat in the prefs.

"Supposing the cheeseling to be made in the morning, it now remains in the prefs, untouched, until the evening; when it is taken out, salted, put into a fresh dry cloth, and left in the prefs all night.

"The method of salting is this: The salt being well bruised, and the lumps thoroughly broken, it is spread plentifully on each side of the cheeseling, so as wholly to cover it, about one-tenth of an inch in thickness, more or less, in proportion to the thickness of the cheese. If this be of a considerable thickness, as suppose three inches and upwards, some salt is put into the middle of it, by stopping when the vat is half filled with curd, strewing on the salt, and on this putting the remainder of the curd.

"Next morning, if the curd be rich, or has been cold run, the cheeseling is turned into another dry cloth, and left in the prefs till evening: but if on the contrary the curd be from poor milk, or from milk which before setting had acquired any degree of sourness, or if it has been run hot and quick, the cheeseling should in the morning be bare-vatted; that is, be put into the vat without a cloth round it, and be put again into the prefs until evening.

"The use of bare-vatting is to take out the marks of the cloth, and thereby evade a waste of labour in bringing the cheese to a smooth glossy coat. The reason for the above distinction is, therefore, obvious; for, the harder the curd, the longer the marks of the cloth are in pressing out.

"In the evening, that which was turned into the dry cloth in the morning, is now bare-vatted; and that which was bare-vatted in the morning, is now turned in the vat; and, having

flood in the prefs until morning, the process is finished. The cheeses are taken out of the vats, and placed upon the shelf."

Mr. Holt tells us that "the farmers about Leigh make their cheese of two meals of milk, the night's milk and the morning's; sometimes the night's milk is skimmed, and part of the cream taken from the cheese; but this not every where, for the best dairies put all in: in the morning when the cheese is to be made, the night's milk is to be heated till it is just as warm as from the cow, and then mixed with the new milk as soon as it is milked;—into this is put a small quantity of rennet just sufficient to come the curd, and no more; for on this just proportioning of rennet and milk, they tell him, the mildness of the cheese greatly depends. The rennet is made from the stomach-bag of a calf, salted and dried, which they call a bag-skin: a piece of this, no bigger than a much worn sixpence, is put into a tea-cup full of water, with a little salt, about twelve hours before it is wanted; and this is sufficient for 18 gallons of milk, which it will come in about an hour and a half, if the bag-skin be good: then the curd is broke down, and, when separated from the whey, is put into a cheese-vat, and pressed very dry, and after that broken very small, by squeezing it with the hands: the new curd used is mixed with about half its quantity of yesterday's, and which has been kept for that purpose; and a part of this new curd is put by for to-morrow, if it can be spared; if not, all to-morrow's is put by to mix with new, as convenience suits, for the best cheese is always made with part old curds. Some mix the old and the new together, after both have been worked very small: others put the old curds in the middle of the cheese; either of which ways will do very well. When the curds have been thus mixed, and well pressed and closed with the hands in a cheese-vat, till they become one solid lump, it is put into a prefs for four or five hours; then taken out of the cheese-vat and turned, by means of a cloth put into the cheese-vat for this purpose, and again put into the prefs, where it stands till night; then taken out, well salted, and put into the prefs again till morning, when it is taken out, and laid upon a flag, or board, till the salt is quite melted, which will be in a day or two; then it is wiped, put into a dry room upon a turning board, and turned every day, till it becomes dry enough for the market."

Excellent cream cheeses are made in Lincolnshire, by adding the cream of one meal's milk to milk which comes immediately from the cow: these are pressed gently two or three times, turned for a few days, and are then disposed of at the rate of one shilling per pound, to be eaten while new with radishes, sallad, &c.

Cheeses of various kinds and qualities are made in different parts of the country; but cheese of the first quality (says Mr. Marshall), that which comes as near perfection as the nature of it admits of, or as art can probably approach, is of a close even contexture; of a firm but unctuous consistency; of a mild flavour, while young; acquiring, by age, an agreeable fragrance. If a cheese of this quality be ironed, it has somewhat the appearance of firm butter; or of wax moderately warmed. If the plug be gently rubbed, the substance of the cheese seems to melt under the finger, which wears it down as it would fine clay duly moistened. If the end of the plug be pinched, it yields to the pressure without crumbling; grinding down, between the fingers, to an impalpable matter. Cheese of this description, improves, by age, in mellowness and flavour.

The following is the account which Mr. Pryce has given of Signor Vitabni's process of making Parmesan cheese. At ten o'clock in the morning, says Mr. Pryce, five *brents* and a half of milk, each *brent* being about forty-eight quarts, were put into a large copper, which turned on a crane, over a slow wood-fire, made about two feet below the surface of the ground. The milk was stirred from time to time; and, about eleven o'clock, when just luke-warm or considerably under a blood heat, a ball

of rennet, as big as a large walnut, was squeezed through a cloth into the milk, which was kept stirring. This rennet was said to have been purchased of a man at Lodie, famous for the composition; but that it was principally made of the same part of the calf as we use in England for that purpose, mixed up with salt and vinegar: it appeared to the writer to be also mixed with old cheese. He much doubts whether there was any great secret in the composition: but it seemed to him that the just proportion of rennet was a matter of consequence, which is not in general sufficiently attended to. By the help of the crane, the copper was turned from over the fire, and let stand till a few minutes past twelve; at which time the rennet had sufficiently operated. It was now stirred up, and left to stand a short time, for the whey to separate a little from the curd. Part of the whey was then taken out, and the copper again turned over a fire sufficiently brisk to give a strongish heat, but below that of boiling. A quarter of an ounce of saffron was put in, to give it a little colour; but not so unnaturally high as some cheeses in England are coloured; and it was well stirred from time to time. The dairy-man (this is not women's work in Italy) frequently felt the curd. When the small, and, as it were, granulated parts felt rather firm, which was in about an hour and a half, the copper was taken from the fire, and the curd left to fall to the bottom. Part of the whey was taken out, and the curd brought up in a coarse cloth, hanging together in a tough state. It was put into a hoop, and about a half-hundred weight laid upon it, for about an hour; after which the cloth was taken off, and the cheese placed on a shelf in the same hoop. At the end of two, or from that to three days, it is sprinkled all over with salt: the same is repeated every second day, for about forty to forty-five days; after which no further attention is required. Whilst salting, they generally place two cheeses one upon another; in which state they are said to take the salt better than singly.

The whey is again turned into the copper, and a second sort of cheese is made; and afterwards even a third sort, as the writer was informed.

Sheep.—This kind of stock is highly advantageous in different points of view. Sheep are important both as supplying food and clothing, and as a mean of improving the farm. Therefore in the breeding of these animals attention must be had to these circumstances. The sheep of different counties excell in these different properties, and in some parts they have been lately much improved by crossing the breeds. Mr. Kent in his Survey of Norfolk observes, that there ought always to be some affinity or similitude between the animals which are crossed. It is, says he, a manifest incongruity to match a Norfolk and a Leicester sheep; or a Norfolk and a South Down; or any long woolled sheep with a short-wooled; but a Leicestershire sheep may be matched, with some degree of propriety, with a Cotswold; and a South Down sheep with a Berkshire or a Herefordshire Ryland.

In the Survey of Staffordshire, Mr. Pitt says, the Wiltshires crossed by a heavy ram have produced sheep, at little more than two years old, of forty pounds per quarter, and which have been sold to the butcher at three pounds ten shillings each. The Dorsetshire breed, which are well made and compact, have often answered well here, and are, in the opinion of some experienced farmers, equal to any other breed; and the fact is, that any breed of sheep, if sound and healthy, may be enlarged and improved by good keeping, and by crossing with rams selected with due attention.

The best sort of sheep for fine wool are those bred in Herefordshire and Worcesterhire; but they are small and black-faced, and consequently bear but a small quantity. Warwick, Leicester, Buckingham, and Northamptonshire, breed a large-boned sheep, of the best shape, and deepest wool. The marshes of Lincolnshire also breed a very large kind of sheep, but their wool is not so good.

The northern counties in general breed sheep with long, but

hairy wool: and Wales breeds a small hardy kind of sheep, which has the best tasted flesh, but the worst wool of all.

The farmer should always buy his sheep from a worse land than his own, and they should be big-boned, and have a long greasy wool curling close and well. These sheep always breed the finest wool, and are also the most approved of by the butcher.

Mr. Pitt in his Survey of Staffordshire tells us, in that populous manufacturing county the considerable demand for lamb, as well as mutton, has induced a great proportion of farmers to keep none other than an annual stock of sheep, consisting of ewes bought in at Michaelmas, from *Cannock Heath*, *Sutton Coldfield*, the commons of Shropshire, and sometimes even from Gloucestershire, Wiltshire, and Dorsetshire. These ewes are immediately put to a ram, and the lambs in spring suckled till they are fit for the butcher: they are then sold, and the ewes kept in good pasture, fatted, and sold after them, and the whole flock generally cleared off within the year. And many people think the profits in this are equal to those in any other way: the lamb and wool will generally pay the original purchase of the ewe, and sometimes more; and the price of the fat ewe remains for keeping and profit.

He also observes that the rams of Mr. Fowler, a celebrated breeder of this kind of stock, are stout, broad-backed, wide on the rump, and well made, with fine wool to the very breech: the largest of them would, he believes, fatten to more than thirty pounds the quarter; and the smallest would be considerably more than twenty. Great attention has been paid for several years past to improving this breed both in wool and carcass. But Mr. Fowler himself thinks the breed is now pushed rather too far in bulk and weight, for the pasturage of the common, or even of the neighbourhood, unless they are driven into better land for fattening. But he is clearly of opinion, that pushing or increasing the size or bulk of sheep, by improving their pasturage, or removing them to a better pasture, does not at all tend to injure the staple, or degenerate the fineness of clothing wool, provided due attention be paid to selecting the finest-woolled rams.

The Leicestershire breeds, says he, are of two kinds, the old and the new. The old Leicesters are well known, as large, thick, heavy sheep, with long combing wool: the new Leicester breed is a refinement upon the old, by crossing with a finer-boned and finer-woolled ram. These are now established in various parts of Staffordshire, and increasing in other places. The old Leicester breeds are crossing with the new, which bids fair to produce a very good breed; there being many instances in which the old breed were become too coarse, and the new too fine. The flock of Mr. Dyott, of Freeford near Lichfield, a gentleman who has attended much to this subject, is closely bred from the new Leicester breed, by means of rams for many years procured from the best breeds. His farming is upon a considerable scale, to the extent of 800 acres or more; and the main object, sheep. His flock of breeding ewes is two hundred and sixty, and he never sells a lamb, which upon the average rearing, are about three hundred. He informed our author, that his annual sales from sheep and wool amounted upon an average to 650l. that his *sheep bags*, or yearling wethers, generally go to the butcher at two guineas each; and the *culls* of this age make thirty-five shillings each; and by keeping to the month of February following, he has sometimes sold them at fifty shillings each, being then less than two years old. This is a proof that this breed of sheep will make a profitable and quick return into the farmer's pocket: he has several times killed sheep when kept to a greater age, that have weighed forty pounds per quarter.

Mr. Pitt says, that there are some other flocks, such as those of Lord Bagot's tenants, and particularly some belonging to Mr. Harvey, his lordship's steward, that deserve attention. This breed, introduced into that neighbourhood a few years back, is

gaining ground fast, and is supposed by many, with whom Mr. Pitt is disposed to concur, to be the best pasture sheep-stock in the kingdom. The superiority consists, or is supposed to consist, in this: that the pastures may be stocked much harder with these, than with any other stock of equal weight; as they are always fat, even when suckling lambs. The ewes full grown will weigh from 20 to 25 pounds per quarter; wethers at two years old, at which age they generally go off, about the same; but when kept another year, they will rise to thirty pounds per quarter. The fleeces weigh from seven to ten pounds. He has observed this year, that the lambs from a ram of this breed were lambed much easier than many others, particularly than those from a ram of the old Leicester breed the preceding year. This our author attributes chiefly, or wholly, to the form, as the ram is finer in the neck and shoulders than a coarse made sheep. These sheep he describes to be fine and light in the bone; thick and plump in the carcass; broad across the loin, with the back bone not rising into a ridge, but sinking in a nick, and, as it were, a double chine of mutton rising on either side; fine and clean in the neck and shoulder; not too short in the leg; and of a sufficient bulk in the carcass to rise to the weight above-mentioned; which bulk in this breed will be apparently less than in any other. But, says he, many other crosses of sheep of considerable merit are to be found in the pastures of different farmers; and perhaps the great superiority of this, or of any breed over all others, has been over-rated by those who have made the comparison. The difference in natural ability and attention of different sheep-masters cannot be supposed so great as to influence the result of their endeavours, in a manner so very superior. Accidental causes may have first raised the attention of those who by assiduity have since contrived to keep the lead. But others will closely press upon them: and as the different breeds of sheep are but different varieties of the same species, to record the idea that any one individual has carried his breed of sheep to a pitch of excellence so much superior to all others, is a libel upon all other sheep-masters. This idea, says he, strikes me more forcibly, since, taking an extensive yet particular view of the sheep of Staffordshire, I have found distinct breeds, each having its peculiar merit; so that it is not very easy to decide the superiority. He who begins with a good breed has doubtless an advantage; but he believes no breed has yet arrived at its *ne plus ultra* of perfection, but remains to be improved upon by future attention.

In Norfolk, those who keep ewe-flocks, Mr. Kent observes, find them answer extremely well; for, besides the fleece and manure, the average price of the lambs is, at this time, twelve shillings. Those who buy the wether lambs at that age, with a view of bringing them up for fattening stock, after keeping them eighteen or nineteen months, generally sell them at an average of thirty shillings; which may be considered as a very handsome profit, as they are only kept as store sheep the first twelve months, and when fattened, in general, an acre of turnips will do for eight; from which however a deduction must be made of about ten sheep, out of a hundred, for casualty.

Mr. Boys informs us, that the management of sheep in the different parts of Kent is as follows: In the eastern part, the flock farmers buy-in lambs at Romney fair the twentieth of August, at from 12s. to 14s. each; and when they have kept them two years, they either sell them lean to the fattening grazier, or make them fat themselves on turnips, and pea or bean-straw. Sainfoin and clover hay are generally too valuable at the watering places to be used for that purpose. Oats, and cullings of garden beans, are sometimes given to finish them in the spring. When these two yearling sheep are sold in the autumn to the graziers, the price is from 24s. to 28s. each; and when made fat, they produce from 34s. to 42s. according to their size and fatness. But these prices have lately considerably advanced.

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The few sheep bred in the marshes are of the same sort, except some small parcels of Dorsetshire and South-Down ewes, which are bought to make early fat lambs; and the ewes are made fat in the autumn. But almost the whole of the sheep kept on the upland farms of East Kent, are the true Romney marsh breed; whose carcasses and bones being large, and wool long and heavy, they require rich land and good keep to make them fat. It seems quite contrary to reason and nature that they should be equally adapted to rich marsh-land and poor chalky downs; and consequently they are not so fit for this district, at least the chalky part of it, as the South-Down sort, whose natural soil is a fine turf on chalk-hills. Impressed with this sentiment, Mr. Boys has himself, for these seven years past, kept no other than South-Down-sheep, and has every reason to be satisfied with them; his flock is about 1000;—400 of which are breeding ewes.

In the Isle of Shepey, the sheep are of the Romney marsh sort, true *Kents*. The soil being much inferior to Romney marsh, the sheep are somewhat smaller; and, from the same cause, their wool is lighter and finer. Some graziers get rams from Romney marsh; others prefer their own sort; and but very few, if any, pay that attention which it is their interest to do, to the wool of the rams they use. The wethers are fattened at three years old, then weighing from twenty to twenty-four pounds per quarter.

The sheep mostly kept in the district of West Kent, are the South-Down sort, bought-in wether-lambs, at the autumnal fairs on the Downs, chiefly at Lewes, the second of October. They are kept the first winter on stubble-land, with grass and a few turnips, and on grass and seeds in summer; and frequently are fattened on turnips the next winter, before they are quite two years old: this is become the favourite sort within these few years, and increases annually in this district. The other sorts of sheep kept there, are the West Country, from Wiltshire and Dorsetshire; the wethers are bought-in at all ages, to be fattened on turnips. But there are hardly any sheep bred in the Weald of Kent, excepting a few for early fat lambs, of the Wiltshire and South-Down sorts.

Some of the Wiltshire wethers are bought-in to fatten on turnips; and a few South-Down wether-lambs are bought in the autumn, and kept on the driest parts until they are two years old, and then made fat for sale on turnips or meadow-lands.

The principal system of management in Romney marsh is that of breeding, rearing, and fattening sheep; and the modes of doing these are the following: The rams are usually put to the ewes, allowing one to forty or fifty, and sometimes sixty, from the twelfth to the sixteenth of November, and stay with them about five weeks. The ewes live entirely on the grass, without any hay, during the winter: in deep snow they scrape with their feet, and obtain a subsistence, although they then lose flesh, and sometimes become very poor by their yearning-time. This marsh produces many twins; but a great number are lost: so that most graziers consider their crop not a bad one, if they wean as many lambs as they put ewes to ram. The lambs are weaned the first or second week in August, and very soon after put out to keep to the upland farmers of the county, where they remain till the fifth of April, at from 2s. to 3s. per score, per week. When they return to the marsh, they are put on the poorest land, or such fields as the grazier thinks want improvement by hard stocking; which is there called *tagging* a field, and is held to be of great service. These young sheep are placed in the fields in proportion to what it is judged each will maintain, from the fifth of April until August, which is at the rate of from four to eight per acre. The *wether-tags* in the autumn are removed to the fattening, and the *ewe-tags* to the breeding grounds, among the two and three

yearling ewes. The wethers remain till July or August following, when, as they become fat, they are drawn out and sold to the butchers at the marsh markets, or are sent to Smithfield. The two yearling wethers, when fat, at this season weigh from twenty to twenty-eight pounds per quarter; and some of the largest and best fed, a few pounds more. The old ewes, there called *barrens*, are put to fattening as soon as their milk is dried after the third lamb, which is at the age of four years, on some of the best land; where they are placed from two to three per acre for the winter. These, in favourable winters, are sometimes made fat, and sold in the spring, soon enough for the same field to take in a fresh set of wethers, and make them fat by the autumn; but this can only be done by light stocking.

The practice of fattening sheep on turnips, assisted by oil-cake, corn, hay, sainfoin, &c. is greatly in use among the upland farmers of this county; not so much for the profit by feeding with those articles, as for the great improvement of the soil where the turnips are fed off. The manure from sheep fed on oil-cake and turnips, is reckoned very enriching to the land. A great number of fold-flocks of lean sheep are kept by the farmers of the eastern part of the county, of from eight to twenty score in number. These are each attended by a shepherd, who removes the fold every morning to fresh ground, at six o'clock in summer, and at break of day in winter: the flock is then driven away to the most inferior keep at the first part of the morning, and is returned into the fold for two or three hours in the middle of the day, while the shepherd goes to dinner: in the afternoon it is gradually led to the best keep on the farm, that the sheep may return full fed to the fold in the evening. Great caution is necessary in feeding sheep on clover in summer, and on turnips in the first part of the winter.

Mr. Robertson has inserted the following account of feeding ewes with early lambs in his Survey of Mid-Lothian, as stated by an accurate observer. The number in all was sixty, fed off in four weeks, the expence as under:

	£.	s.	d.
"To 2 bolls of grains per day, at 2s. per boll, 28 days,	5	12	0
To 2 pecks of oats, ditto, 1s. per peck, ditto,	-	2	16
To 3 stone of hay, ditto, 6d. per stone, ditto,	-	2	2
To 1-4th acre of turnips; - - - - -	1	10	0
	£.	12	0

"Thus each lamb cost 4s.

"Feeding with turnips, oats, and hay, takes five weeks to feed off.

	£.	s.	d.
"20 ewes will eat 1-half-acre of turnips in 35 days,	3	0	0
ditto, a peck of oats daily, hence, - - -	1	15	0
ditto, a stone of hay per day, - - - - -	0	17	6
	£.	5	12

"This comes to 5s. 7½d. each lamb.

"Feeding on grafs takes six weeks to feed off. The average rent of good grafs may be two pounds per acre, which will feed off four ewes with lambs. He considers six weeks from the middle of April, the usual time of laying on, to be full 1-half of the value of the grafs for that season; hence the lambs cost 5s. each in that time. In turnip-feeding sheep, by flaking them on the field, 20 sheep eat an acre in 14 weeks. If they be led off to a grafs field, ten score will *eat* or dung an acre in seven days, worth 2l. 10s.

"As to feeding in the house, he finds the dung worth the trouble of carting, and the value of the straw it takes for litter. He finds also the lambs fed on grains, not only sooner ready, but more white and firm in the flesh; the ewes are also in better

condition. He likewise found, that, at times, to mix a little salt among the grains, was of great service; but it was necessary to avoid, above all things, giving them grains when sour, or old kept; and of importance also to feed them regularly, and to give them fresh clean litter every day."

A sheep will consume about twenty pounds of turnips in twenty-four hours, provided it be allowed as many as it can eat, which should always be allowed to fat sheep; but as sheep vary in size, so they will consume more or less food.

Hogs.—In general, those kinds of hogs which are the best for feeding, are wide made, plump, and round in the carcase, light of bone, with short legs and soft hair.

In Staffordshire, Mr. Pitt says, the breed of hogs most esteemed is not the large shouched-eared breed, but a cross between them and a smaller dwarf breed. They should be fine in the bone, thick and plump in the carcass, with a fine thin hide, and of a moderate size; large enough to fat, at from one to two years old, to the weight of from three hundred to four hundred pounds each. These, if well bred, will keep themselves in good plight with little feeding, and will soon grow fat with a plentiful allowance of proper food. Hogs of the large breed have been fattened there, to from six hundred to eight hundred pounds weight, exclusive of the entrails; but, requiring much time and food, have pretty generally given way to a smaller-sized, finer-boned, thick, plump animal. Hogs are generally fattened there by farmers with the refuse of the dairy, boiled potatoes, and barley meal, and peas either whole or ground: by millers, with what they call *sharps* and *gurgeons*, that is, with the husk or bran of wheat ground down, but not wholly divested of its flour; also with other sorts of grain, and pulse ground down: by butchers, with the refuse or offal of slaughtered animals. The best way of managing the potatoes, is to boil them in their own steam, and put them afterwards into a large oven when the bread is drawn, to evaporate the watery parts: they will then go nearly as far as chestnuts or acorns in feeding.

In Lancashire, Mr. Holt observes, that Mr. Eccleston has a breed between the wild boar and the Chinese, which have very light and small bellies. Upon the same food, this gentleman thinks they will yield one fourth more flesh than either the large Irish or Shropshire breeds. Their size is but small, weighing only from ten to fifteen score, generally about twelve score.

In Kent, a great number of pigs are reared and fed on the corn-stubbles for the butchers, which are killed in the autumn for roasting-pork, at the age of three or four months, then weighing as many score pounds each. Some are also fattened and killed at from six to twelve months old, and sold to small families in the neighbouring towns and villages, or to pork-butchers, who retail them in sides and quarters to those families. The business of rearing and fattening hogs for sale, is generally considered as a bad one in this part of the country. In the western part of this district, there are a few farmers who have the larger kind, or Berkshire-breed of hogs; but in general they are mixtures of many different sorts. Little attention, says Mr. Boys, is paid to this animal, though the breed might, doubtless, be very much improved with proper care. Many hogs, says he, are likewise kept in the woods of the Weald of Kent in the autumn, on acorns, and fattened on corn in the winter.

Pigs, in the opinion of Mr. Holt, should, during the stage of their growth, be regularly turned out to graze, where there is a conveniency. This, besides the advantage of grafs, which is nutritious and helps digestion, by the fresh air and exercise, causes a disposition to take their rest, and sleep after a meal, contributes to their cleanliness, and renders their flesh of superior flavour.

Exp. IV. In the beginning of June, 1766, he confined sixty hogs, half and three-fourths grown, in his hog-yard (a pond's mouth in it) and fed them fourteen days with clover, mown fresh every day: it was given in their troughs, with racks across to prevent the soiling it. They fell off in their looks in about four days, and grew worse and worse, several dying. At the end of that time, he gave them some malt, grains, and wash every day for a few days longer; but the effect was no better, more dying. They were then all

turned into the clover-field whence it had been taken, and confined constantly to it for some time. Not one more died, for all throve greatly. It will not perhaps be impertinent here to add, says he, that I never found any method of using clover more beneficial than thus applying it to the feeding of hogs.

Exp. V. At the time of the preceding experiment, eight hogs of equal size were divided into two lots, and confined to two fyes. Four were fed fourteen days on clover mown, and the other four on lucerne mown; they were given at the same time, and in the same fyes. At the end of that time the same were viewed attentively: both were bad, the clover ones much the worst, one near dying.

Exp. VI. In the month of December, 1766, twenty pigs, that had been weaned a month, were draughted into four parcels, and kept that month separately in the following manner:

- No. 1. Boiled carrots.
- 2. Boiled potatoes.
- 3. Boiled turnips.
- 4. Boiled cabbages.

At the end of the month they were turned out and viewed attentively. The result was,

- No. 1. the best—boiled carrots.
- 2. next—boiled potatoes.
- 3 and 4 equal—all nearly dead.

Carrots continue, in every trial, superior to all common vegetable food. I am, says he, not at all surpris'd at the ill success of turnips and cabbages.

Exp. VII. In June, 1767, he draughted from his hogs twenty that were of a perfect equality in size and appearance; they were even half grown; marked them into four lots, and turned

- No. 1. into his clover field.
- 2. lucerne ditto.
- 3. sainfoin ditto.
- 4. burnet ditto.

In another month they were drove up and viewed: the result was,

- No. 2. the finest—lucerne.
- 1. next—clover.
- 3. next—sainfoin.
- 4. very indifferent—burnet.

The result of this experiment he thinks decisive in favour of lucerne, and likewise in the proportionable merit of the other articles: but it must be farther enquired into by future experiments.

The result of these trials is thus given:

Milk mixed with pollard appears to be, of all food, the most proper for rearing pigs. Milk alone is good. Boiled carrots excellent, and fully proved to be sufficient for any farmer to depend on who does not keep a good dairy. Potatoes boiled to a batter, also a very good food. Turnips, cabbages, and malt-dust very bad. Of green food, that which is growing is clearly the best; mown, and given in fyes, it is pernicious. In the field, lucerne is superior to all the rest. Clover comes next, then sainfoin: all these three are good. Burnet last and bad.

He then instituted a set of experiments in order to discover what kind of food was most proper for fattening hogs, when given to them separately, and the best mixtures of them for that purpose.

Exp. II. In January, 1766, he drew from the herd ten hogs, as equal in size as possible, and weighed them alive in five lots.

No. 1. weighed stone lb.
13 4

No. 2. weighed stone lb.
12 6
3. 13 0
4. 12 11
5. 13 1

A nearer quality than this, in matters that can neither be added to nor diminished, can scarcely be expected.

No. 1. was fatted with white pease, that weighed 56lb. per bushel; the price 30s. per quarter.

No. 2. with pollard that weighed 22lb. per bushel; price 9d. per bushel.

No. 3. with buck-wheat 47lb. per bushel; price 2s. 3d. per bushel.

No. 4. with boiled potatoes 54lb. per bushel; price 2s. per bushel.

No. 5. with boiled carrots 55lb. per bushel; price 1s. 1d. per bushel.

He thought it best to fix on a given sum, as proper to fat each hog. The people he consulted were of opinion that eight bushels of white pease were necessary to fat one such hog well. This he accordingly fixed on as his criterion. The account of the expence therefore stood thus:

					£.	s.	d.
No. 1. Pease, 16 bushels	-	-	-	-	3	0	0
2. Pollard, 80 bushels	-	-	-	-	3	0	0
3. Buck-wheat, 27 bushels	-	-	-	-	3	0	0
4. Potatoes, 28 bushels at	2	16	0		3	0	0
Labour and coals	-	0	4	0			
5. Carrots, 49 bushels	-	2	13	2	3	0	0
Labour and coals	-	0	6	10			

Each lot was weighed as soon as the food was done. The result was as follows:

No. 1. weighed stone lb.
27 6
2. 27 9
3. 29 13
4. 25 7
5. 31 0

It is evident from this experiment, that carrots boiled are superior to any other food. He did not expect that potatoes would be so much inferior; but he has found, from divers other trials since, that it is requisite to mix the meal of some kind of corn with them. Pollard in this trial, as in the last, is superior to pease.

With respect to the comparative fattening quality of carrots and potatoes, it appears by this experiment that lot No. 5. gained 17 stone 13 pounds weight in flesh, fed upon carrots; and lot No. 4. fed upon potatoes, gained but 12 stone 10 pounds. The difference was 5 stone and 3 pounds of flesh gained by feeding on carrots, more than was gained by their feeding on potatoes; a great superiority when viewed in this light. But on the other hand, to gain this greater weight there was a consumption of 49 bushels of carrots, and but 28 of potatoes. But 49 bushels of potatoes (the same quantity as the carrots) would, in the above proportion, advance such a lot of hogs to the weight of 22 stone and 4 pounds; that is, to 4 stone 5 pounds more in weight, than the same quantity of carrots did advance them; by which it appears that potatoes are really more fattening than carrots, of the same measure or weight. The hogs seem to relish carrots much, and they eat a great quantity of them; but taking an equal quantity of each, the potatoes go farthest in fattening hogs: a circumstance that merits the farmer's attention; for it is much more difficult to find a soil that is proper for carrots than for potatoes, and the produce from an acre of potatoes is nearly as great, and frequently greater than the produce of carrots; nor is there much difference in the expence. This however is certain, that in most farms, there

is much more land proper for potatoes than for carrots. The price of the potatoes, in this instance, is indeed much higher than the carrots; but that is a circumstance merely local, it is not so in all places; as the farmers may, in general, raise potatoes as cheap as they can carrots, and in much greater quantities.

The other experiments in Mr. Young's paper, were made in order to discover the fattening quality of several sorts of food, when mixed together; pollard, bran, and of beans, pease, buck-wheat, and barley ground into meal; upon which he makes the following observations. It appears from these experiments, that pollard alone, at the preceding prices, is a cheaper food than pease alone. That boiled carrots is much the most profitable food that has been tried. That buck-wheat is a more profitable food than pease. That several kinds of food mixed are better than given alone. That the meal of any one, or various kinds of grain is better, and more profitable, than the whole grain mixed or alone. That pease and barley are a much sweeter food than beans.

Rabbits.—Mr. Marshall, in the Rural Economy of Yorkshire, observes, that in situations where the ground, as well as the soil, is suitable to rabbit-warrens, and where an extent of it sufficiently large can be collected together in one property, there is a very strong reason why it may be profitably stocked with rabbits.

And in his Minutes on Norfolk, he says, a level country is unfit for rabbit-warrens, but convenient for the plough: on the contrary, rabbits delight in the sides of sandy hills; which, where turnwrist ploughs are not in use, are extremely inconvenient for tillage; and, when cultivated, are generally unproductive. The rabbit, on level ground, finds it difficult to make its borough; the excavated mould is all to be dragged upward to the surface: hence a piece of ground altogether level can seldom be stocked successfully with rabbits, unless it be first laid up, by art, at a great expence, into inequalities. On the contrary, against the side of a steep hill the rabbit has no difficulty to encounter: the declivity affords him a ready vent for his mould; his work is all down hill: and unless the soil be too stubborn, or too rocky, for the rabbits to work freely among, a broken hilly country may generally be stocked with advantage; provided a tolerable market for the carcases can be had within reach. There are, says he, perhaps, few sandy or other loose foiled hills, which would not pay better in rabbit-warrens than under any other course of husbandry.

Those who keep rabbits tame for profit, breed them in hutches; but these must be kept very neat and clean, otherwise they will be always subject to diseases. Care must be taken also to keep the buck and does apart, till the latter have just kindled; then they are to be turned to the bucks again, and to remain with them till they shun and run from them. The best directions for the choosing of tame rabbits, are to pick the largest and fairest: but the breeder should remember, that the skins of the silver-haired ones sell better than any other. The food of the tame rabbits may be colewort and cabbage leaves, carrots, parsnips, apple-rinds, green corn, and vetches, in the time of the year; also vine leaves, grass, fruit, oats, and oat-meal, milk thistles, sow-thistles, and the like; but with these moist foods they must always have a proportionable quantity of dry foods, as hay, bread, oats, bran, and the like; otherwise they will grow pot-bellied, and die. Bran and grains mixed together have been also found to be very good food. In winter they will eat hay, oats, and chaff, and these may be given them three times a day; but when they eat green things, it must be observed that they are not to drink at all, as it renders them dropical: and at other times a very little drink serves them, which should always be fresh. When any green herbs or grass are cut for their food, care must be taken that there is no hem-

lock among it; for, though they will eat this greedily among other things, when offered to them, it very soon destroys them.

These animals are subject to two principal infirmities. First, the rot, which is caused by the giving them too large a quantity of green food, or from the giving it fresh gathered, with the dew or rain hanging in drops upon it. It is over moisture that always causes this disease; the greens therefore are always to be given dry, and a sufficient quantity of hay, or other dry food, intermixed with them, to take up the abundant moisture of juices. On this account, the very best food that can be given them, is the shortest and sweetest hay that can be got, of which one load will serve two hundred couples a year.

The second disease to which these creatures are subject, is a sort of madness: this may be known by their wallowing and tumbling about, their heels upwards, and hopping in an odd manner into their boxes. This distemper is supposed to be owing to the rankness of their feeding: and the general cure is the keeping them low, and giving them the prickly herb called tare thistle to eat.

The general computation in respect to males and females is, that one male rabbit will serve for nine does: some allow ten to one buck; but those who go beyond this, always suffer for it in their breed.

Poultry.—Under this head are comprehended a great variety of birds, which are objects of attention to the farmer.

Fowls.—The farm-yard cannot be said to be complete until well stocked with fowls; the advantage of which will be most considerable in situations where the farmer is best supplied with grain, and has the best means of preserving the birds. In choosing this kind of stock, it is necessary to prefer the best breeders and the best layers; the oldest being always reckoned the best sitters, and the youngest the best layers; but no sort will be good for either, if they are kept too fat. The best age to set a hen for chickens, is two years old, and the best month to set them in is February; though any month between that and Michaelmas is good. Hens sit twenty-one days, during which time they should constantly have meat and drink near them, that they may not straggle from their eggs, and thereby chill them. If fowls are fed with buck or French wheat, or with hemp-seed, it is said they will lay more eggs than ordinary; and buck-wheat, either whole or ground, made into paste, which is the best way, is a grain that will fatten fowls very speedily; but the common food used is barley meal, with milk or water, but wheat-flour moistened is probably the best. A good hen should be working, vigilant and laborious, both for herself and her chickens, and the larger the better. The elder hens are rather to be chosen for hatching than the younger, because they are more constant, and will sit out their time; but if you choose for laying, take the youngest. Those eggs that are laid when the hens are a year and a half, or two years old, are the best; at that time you must give the hens plenty of victuals, and sometimes oats, with fenugreek to heat them, if you would have large eggs.

In setting hens, take care that the eggs be new, which may be known by their being heavy, full and clear.

While sitting, a hen should not be taken off or disturbed from her nest, for that will make her utterly forsake it.

A hen-house should be large and spacious, with a pretty high roof and strong walls, in order to keep out thieves and vermine; there should likewise be windows on the east side, that they may enjoy the benefit of the rising sun; and round about the inside of the walls, upon the ground, should be made large pens of three feet high, for geese, ducks, and large fowls to sit in; and near unto the covering of the house long perches, reaching from one side of the house to the other, should be fixed, on which cocks, hens, capons and tur-

keys may fit. At another side of the house, at the darkest part of the ground pens, fix hampers full of straw for nests, in which hens should lay their eggs; but when they sit to hatch chickens, they should be on the ground: there should likewise be stakes stuck in the walls, that the poultry may climb to their perches with the greatest ease; and the floor should not be paved, but made of earth smooth and easy. The smaller fowls should also have a hole made at one end of the house, to go in and come out at when they please, or else they will seek out roosts in other places. It would likewise be of great advantage to have the hen-house situated near some kitchen, brew-house, bake-house, or kiln, where it may have the heat of the fire, and be perfumed with smoke, which is very grateful to pullets.

In order to fatten chickens, you must put them into coops, and feed them with barley-meal; put likewise a small quantity of brick-dust into their water, which they ought never to be without: this last will give them an appetite to their meat, and fatten them very soon; for in this case it must be considered, that all fowls and birds have two stomachs, as they may be called; the one is their crop, that softens their food, and the other the gizzard, that macerates the food: in the last we always find small stones and sharp sand, which help to do that office; and without them, or something of that kind, a fowl will be wanting of its appetite to eat; for the gizzard cannot masticate, or, as it may be said, grind the food fast enough to discharge it from the crop, without such sand or stones: and in this business the brick-dust assists them.

The following method will probably be found still more advantageous; for a very short time is necessary for this purpose, as chickens, if not fattened in a week, become disordered. In order to promote this end, poultry should be fattened in coops kept *very clean*. They should be furnished with gravel, *but with no water*. Their only food barley meal, mixed so thin with water as to serve them for drink. Their thirst makes them eat more than they would, in order to extract the water that is among their food. This should not be put in troughs, but laid upon a board, *which should be clean washed every time fresh food is put upon it*. It is foul and heated water which is the sole cause of the pip.

This kind of flock is liable to be affected with different disorders, such as the *pip*, the *roup*, the *flux*, *stoppage* in the bowels, and *sores* eyes.

The first of these complaints is occasioned by eating foul meat, and drinking dirty water, and is known by the fowl having a thin white scale on the tip of the tongue. The remedy of this disorder is, the removal of the scale, and slightly rubbing the part with salt.

The second is merely a swelling on the rump, which is known by the feathers of the affected part standing out in an unnatural manner. The cure is to be attempted by *opening* the sore, and forcing out the *core* after the feathers have been plucked out.

The *flux* is caused by eating too much moist food, and is to be removed by an opposite kind of diet.

The removal of the disorder in the eyes of this kind of fowls, must be attempted by changing their situation and food.

Ducks.—These are very necessary for the farm-yard of the husbandman, as they require no charge in keeping, but live on lost corn, worms, snails, &c. for which last reason they are very good in gardens. Once in a year they lay very well, especially that sort of duck that turns up the bill more than the common kind; when they sit they need little attendance, except to let them have a little barley, or offal corn and water near them, that they may not straggle far from their nest, and thereby chill their eggs. In general it is found more profitable to set a hen upon the duck's eggs, than any kind of duck whatever, because the old one leads them when hatched too soon to the water,

where, if the weather be not very mild, some of them will be lost. Put by means of the hen, they remain a good while upon the land, and get hardy before they venture into the water. About thirteen eggs is the proper number to let a duck sit upon. When the ducklings are hatched they require no care, if the weather be tolerably good; but if they happen to be produced in a very rainy season, it would be right to keep them under cover a little, especially in the night; for, though the duck naturally loves water, it requires the assistance of its feathers, and, till they are grown, is easily hurt by the wet.

It may here be observed, that the fattening of ducks at any age is very easy; and that whether it be the duckling, or the grown duck, the method to be used is exactly the same. They are to be put in a quiet dark place, and kept in a pen, where they are to have plenty of corn and water: any kind of corn will do; and with this single direction they will fatten themselves extremely well in fifteen or twenty days.

The manner of fattening these birds in Languedoc in France, is this: When the ducks are pretty fat by the usual modes of feeding, they are shut up eight by eight in a dark place. Every morning and evening, a servant puts their wings across, and, placing them between his knees, opens their bill with his left hand, and with his right fills the craw with boiled maize: they sometimes die suffocated; but they are not a bit the worse for it, provided care is taken to bleed them directly. These unfortunate animals pass there fifteen days in a state of oppression and suffocation, which makes their liver grow large, and keeps them always panting, and almost without breathing. When the tail of the duck spreads out like a fan, they know that it is fat enough; they are then turned out to bathe in water, after which they are killed and dressed for use.

Two ducks being opened, of which the one had not, and the other had been crammed; the first had a liver of the natural size, the skin equally thick in all places, and the lungs perfectly sound. That which had been crammed, had an *enormous liver*, which, covering all the lower part of the belly, extended as far as the *anus*. (The ducks are generally suffocated, when, by the pressure of the liver, the *anus* is opened, and the liver appears at its orifice.) The lungs were small, and loaded with blood. The skin of the belly, which covered the liver, was of the thickness of a shilling. When the ducks thus crammed have been plucked, they seem balls of fat, and none of their members are discernible.

Geese.—These are advantageous both for food, feathers, and grease. They will live upon commons, or any sort of pasture, and need little care and attendance; only they should have plenty of water. The largest geese are reckoned the best; but there is a sort of Spanish geese that are much better layers and breeders than the English, especially if their eggs be hatched under an English goose. Geese in general lay in the spring, the earlier the better, because of their price and of their having a second brood. They commonly lay twelve or sixteen eggs each. You may know when they will lay, by their carrying off straw in their mouths, and when they will sit, by their continuing on their nest after they have laid. A goose sits thirty days; but if the weather be fair and warm, she will hatch three or four days sooner. After the goslings are hatched, some keep them in the house ten or twelve days, and feed them with curds, barley-meal, bran, &c. After they have got some strength, let them out three or four hours in a day, and take them in again, till they are big enough to defend themselves from vermine.

For fattening *green* geese, they should be shut up when they are about a month old, and they will be fat in about a month longer. The fattening of older geese is commonly done when they are about six months old, in or after harvest, when they have been in the stubble-fields, from which food some kill

them; which is a good way: but those who have a mind to have them very fat, shut them up for a fortnight or three weeks; and feed them with oats, splitted beans, barley meal, or ground malt mixed with milk: the best thing to fatten them with, is, however, probably malt mixed with beer. Geese will likewise feed on and fatten well with carrots, when cut small, and given them.

But the method of fattening them in Languedoc, in France, is thus stated by Doctor Anderson, in his valuable Essays: "After the bird is got into *full flesh* (i. e. by being well kept upon green food), it is necessary not to delay the fattening of them too long, lest you lose the season entirely. About the end of December they enter into rut, *after which time they will not fatten at all*. As soon as the frost has set in (usually towards the end of November), they are shut up, to the number of *ten or twelve* (never more), in a dark still place, where they can neither see light, nor hear the cries of those which are kept for laying. They remain in that prison till they have attained the greatest degree of fatness, and are ready for killing: that moment must be seized, otherwise they would very soon turn lean, and at last die. There are two ways of fattening them. The *first* is, by giving them a trough filled with grain which they call *farde*, so that they may eat whenever they please. The geese fattened on this grain are very delicate. Others put into the trough grains of maize boiled in water. They take care to give them *plenty* of that food, and to *keep the coop clean*. At the end of two or three weeks, the geese are all fully fattened. They are then taken out of the coop, and allowed to go at large into the water for twenty-four hours. Without that precaution, their flesh would have a disagreeable flavour. The above, says the Doctor, may be called the natural method of fattening, by *enticing* them to eat food enough of their own accord. The *second* may be called the *artificial* method, and is as follows: The geese are put up in the same manner as before, and are *crammed* twice a day, by putting into their craw, by means of a tinned tube, as much as it will hold of maize boiled in water. The tube is used, because, the bill of the goose being furnished with teeth, the person who should attempt to perform that operation by hand, would soon have it scratched and torn to pieces. By this means, the geese acquire a *prodigious fatness*, so that a pair sometimes weigh from fifty to sixty pounds. Their liver weighs from one pound to a pound and a half,—is white and delicate;—but has a slight bitterness to the taste, which the liver of a duck has not. The *beaks* are large like a small apple, and when dressed on the gridiron they are excellent eating. The feet are boiled, after which they are fried the same as the tongue."

In some countries they shear the geese for their feathers, and in others they pull them once or twice a year; but the latter way is more injurious to them.

Turkeys.—These are fowls that prosper very well in open countries, where there is not much shelter to harbour vermine to destroy them, as they are naturally inclined to ramble. The hens are so negligent of their young, that, while they have one to follow them, they never take any care of the rest; and therefore great care must be taken of them while they are young, to watch them, and to keep them warm, being birds that cannot bear the cold. Some, however, where they have the conveniency of a small cover near the house, let them take their liberty, and seek their own nests; but it is only in some particular places that they do well with such management.

When kept with corn, they are very great feeders; but if left to their liberty when grown up, they will get their own living, without either trouble or expence, by feeding on herbs, seeds, &c. Turkeys, being very apt to straggle, will often lay their eggs in secret places; therefore the common sort of them must be carefully watched, and made to lay at home. They

begin to lay in March, and will sit in April. Eleven or thirteen eggs are the most they sit on. They hatch in between twenty-five and thirty days. The young ones may be fed either with curds, or green fresh cheese cut in small pieces. Their drink may be new milk, or milk and water. Some give them oatmeal and milk boiled thick together, into which they put wormwood chopped small, and sometimes eggs boiled hard, and cut in little pieces. They must be fed often, as the hen will not take much care of them herself; and when they have got some strength, feed them abroad in a close walled place where they cannot stray; they must not be let out till the dew is off the grass, taking care to have them in again before the night, because the dew is very prejudicial to them.

In the fatting of turkeys, *sodden* barley is very excellent, or *sodden* oats for the first fortnight, and for another fortnight it may be necessary to cram them as is done with capons.

From some of the various facts which have been stated above, respecting the feeding of poultry, Doctor Anderson draws the following conclusions: Not only do they, says he, confirm the general position, that the more food an animal can be made to take in a given time, the quicker it will be fattened; but this rule seems to hold, when it is given even in a *burdensome* quantity, beyond what the animal would naturally have taken; and farther, that by certain modes of feeding, when well understood, the size of particular parts of the body can be augmented at pleasure, far beyond their natural proportions. Could the quantity of tallow in quadrupeds be augmented nearly in the same proportion to the liver; in this case, it is evident the profit to the owner would be greatly augmented.

Pigeons.—These, Mr. Pitt observes, can hardly in general be considered as an article of profit to the occupier of a farm; though there are instances in Staffordshire, where something handsome is actually made of them by tenants; yet these instances are rare, and too seldom occur to be reckoned upon in a general account. But few farm-houses are indeed furnished with the necessary accommodations for them: and the increase of pigeons beyond a certain degree must doubtless, he thinks, be injurious to the cultivation of grain: within due bounds, says he, they do little harm; but increased beyond it, they prove pernicious vermine, both to the new-sown crops and the early part of harvest. They are particularly voracious in early pease; he has therefore no wish to see them much increased, conceiving the advantage arising from their increased numbers, for consumption as food, to be more than counterbalanced by the mischief occasioned by their depredations. And Mr. Kent says, that pigeons are much fewer in Norfolk than formerly, as many of the pigeon-houses have been dropt, on account of the injury which the pigeons do to thatched buildings.

Bees.—For the advantageous culture of these industrious insects, the situation of the farm should be suitable; and also well supplied with their proper food. The ingenious Mr. Bonner, who has paid much attention to the cultivation of bees in Scotland, lays down the following plan and directions for the speedy increasing of bee-hives in that country:

If a gentleman of property, says he, has a proper situation for bees, and be inclined to commence the cultivation of bees with spirit, let him apply to some person tolerably skilled in that branch of science, and let him purchase one hundred or more bee-hives, in the month of August, and place them properly, according to the directions which shall be laid down hereafter. Let him next rear a sufficiency of turnips in their neighbourhood, that they may blossom next spring; and in the month of February let him sow some mustard seed, and some furze and broom upon dykes or waste ground. Gentlemen of property, who have any ground proper for planting, should by all means plant a number of plane-trees and fallows. They should likewise sow a good deal of white clover, sweet residu, or

nignionette, &c. with any other flowers that will grow upon the ground, either by nature or art. In winter, particular care should be taken to preserve the bees from cold; in spring, from famine, and robbery by other bees. And when they are ready to swarm, great care must be taken to lodge them in proper habitations. With such attentive management, he can venture to assure all who will make the experiment, that one hundred well chosen stock-hives will, in a tolerably good season, produce from one hundred and eighty to two hundred or even two hundred and twenty hives, or more.

Supposing, says he, that there are, in May 1795, twenty stock-hives in each parish in Scotland, the amount in eight hundred parishes would be sixteen thousand. Then, supposing each of these hives to throw one swarm, which would probably keep through the winter, in September we should have thirty-two thousand stock hives. At this period, let every gentleman who rears bees, keep all his hives, young and old, for stock hives, that are fit for it; let the poor, who are able, do the same with theirs;—and let those who are not able to lie out of the produce of their bees, sell them to those who are inclined to purchase them for stock-hives. By doing this, they will raise as much honey as if they killed all the bees and sold the honey and wax, and with far less trouble. On these principles, by keeping thirty two thousand stock-hives, with proper management, during a tolerable season, and always preserving all that will preserve, for the space of seven years, the stock would, he thinks, increase as follows, viz.

	Hives.
In the 1. year, Sept. 1795, there would be	32,000
— 2. ——— 1796, ———	64,000
— 3. ——— 1797, ———	128,000
— 4. ——— 1798, ———	256,000
— 5. ——— 1799, ———	512,000
— 6. ——— 1800, ———	1,024,000
— 7. ——— 1801, ———	2,048,000

Thus, he concludes, that within the short period of seven years, the number of our bee-hives would be increased to no less than *two millions and forty-eight thousand hives*. But allowing the forty-eight thousand to be discounted for dead hives, there would still remain two millions of stock hives. Although this number may appear large, yet there is no reason to suppose that the calculation is either impossible or improbable. But even dropping the one-half of this number, upon the supposition of losses by bad seasons, &c. there would still remain, at the lowest estimate, a clear *million* of stock-hives; which next year might produce *four millions* of pints of honey, and *one million* of pounds of wax, and still keep the stock entire. With such a quantity, indeed, of these useful animals, and valuable commodities, we might rest contented; as such a quantity, besides every other advantage, would afford employment to hundreds of old and poor people to watch them in swarming time, and to make hives to receive the young colonies of these animals.

Situation of the Apiary.—As a general rule, place your hives where they will be least exposed to the wind, and enjoy as much of the influence of the sun as possible; for wind always retards the bees in their work, while the sun's beams invite them to it. Although it is well known, that bees will thrive well in high and windy situations, yet a low one is always to be preferred. In the neighbourhood of the apiary, there should be abundance of flowers, from which the bees may collect their wax and honey. Were a choice allowed me, says Mr. Bonner, where to place my bees, it would be in an early situation,—a hollow glen by the side of a rivulet, surrounded with abundance of turnips in blossom, in the spring,—mustard and clover in summer,—and heath in the latter end of summer and harvest; with a variety of other garden and wild flowers in their seasons. However, he would not be understood as if he

hinted that bees will not thrive unless they be placed in such an advantageous situation, as the contrary can be proved: for bees have thriven amazingly well in places where they were not within reach of many of the above-mentioned flowers: but although they will do well in most situations, and fly far for food, yet they will thrive far better when situated among or near good pasture, and surrounded with abundance of food.

Food of Bees.—Among the great variety of flowers, which wise Nature has so profusely laid before our noble insects, from which they may abundantly supply themselves with food, we shall, says the same author, in the first place, give some particular account of those five principal ones in this country, from which bees extract vast quantities of honey;—viz. turnips, rape, mustard, clover, and heath; and then some account of many other excellent flowers which bees feed on. Turnips, in particular, blow early in the spring, and continue long in flower; and they also yield both honey and farina, by which the bees are greatly excited to go abroad, and work upon them; when perhaps, in late situations, they have scarcely any other flower to work upon. In such places, therefore, it is highly proper that turnips be sowed, and allowed to remain in the ground during winter. These, yielding their flowers from the middle of March to the end of April, will afford the bees six weeks good pasture, and thus render them equal to those in more favourable, or earlier situations; whereas they would perhaps have scarcely had any other flower to work upon, that could do them much good. He, therefore, strongly recommends to all proprietors of bees, particularly those in late situations, if they can by any means, to let always as many turnips run into blossom in the spring, as may be sufficient to afford plenty of early pasture for their bees to work on. *Ruta-baga*, or Swedish turnip, would answer well for this purpose, as it is equally good for cattle after it has blown, as before. Thus the rich may supply themselves with that feed for sowing, and the poor will have it to sell to those who need it, which will enable them to pay the rent of the ground they grow upon. The rape in blossom answers the same end to bees as the turnips; and as it is a little later of flowering, it will yield the bees a fresh and seasonable supply, when the turnips begin to fade, and thereby keep them constantly at work till the latter end of May, when all the herbs of nature will, as it were, vie with each other, which shall contribute most to supply this noble and virtuous race with abundance of the sweetest nectar. Then, at this season, the balmy plane-tree regales them in the morning, before the drowsy herd ascends the hill to relieve his imprisoned bleaters; and the gold-like surze, mustard, and broom, invite them to feast till the day decline. Garden and wild mustard, with runches of all kinds, bees are very fond of, and work keenly thereon; and these flowers are attended with this advantage, that by sowing their feeds at different times in the spring, their flowering may be so protracted as to afford the bees a sufficiency of pasture during the whole working season. In June the white clover comes, which continues long in blossom, and also yields abundance of the finest of honey: and wherever the proprietor of bees has it in his power, he should be particularly attentive to raise it in his pasture lands. So fond are the bees of this flower, that, whenever it appears, they will desert and overlook many other excellent flowers, as unworthy of their attention, and eagerly dart upon it, and work and sing thereon all the day long, until the cold evening chase them with reluctance home to rest. But as all nature's beauties fade, and thereby give way to their successors, so does this beloved herb, as, about the end of July, they begin to blacken, and the balmy dew to forsake their sweetest lips; then our heroes go in search of fresh provisions, and in their rambles, as they skim over our lofty mountains, are attracted by the blue heather bells, which are here in great numbers. Heath is attended with this advantage, that it needs no culture nor rearing;

but, on the contrary, grows spontaneously, in too great abundance, in many places; as most certainly the greater half of Britain is covered with it: but, like the clover, it yields also vast quantities of the finest honey; and, when the month of August is favourable warm weather, no thriving hives of bees, placed near it, need fail, in a short time, to enrich themselves with plenty of honey. The flowers of furze, broom, and plane-tree, as formerly hinted, are also highly grateful to bees, as all of them afford abundance of matter to collect their honey and wax from. Furze in particular generally flowers early, and continues long in blossom. But besides the flowers above mentioned, there is a great variety of others, which, in their different seasons, afford employment and materials for the bees; such as lilies, rose marys, yellow gowans, and the blossoms of crocuses, snow-drops, oziars, fallows, vetches, alders, poppies, beans, gooseberry bushes, and fruit-trees of all kinds. In short, he knows no flower that they will refuse, when they are at a loss for variety. *There is one thing very observable, that whatever flower a bee first pitches upon, she always continues to work upon the same species till she is loaded, although she should be obliged to fly over better kinds, and even to some considerable distance for them: but, if the bees cannot obtain a full loading from those flowers which they prefer, they sometimes make up the remainder from other flowers which they meet with.*

Method of choosing a Stock.—Those who intend to erect an apary, must take particular care to have it filled with proper inhabitants. They must be peculiarly attentive to this, as all their future profit and pleasure, or loss and vexation, will, in general, depend upon it. They must therefore pay the utmost attention to the choice of their stock hives; for the man who takes care to keep good stock hives will soon gain considerably by them; but he who keeps bad ones, will, besides a great deal of trouble, and little or no success, soon become a broken bee-master. In September every stock hive ought to contain as much honey as will supply the bees with food till June following; and as many bees as will preserve heat in the hive, and thereby resist the severity of a cold winter, and act as so many valiant soldiers, to defend the community from the invasions of foreign enemies in spring. Therefore the bee-master should purchase a proper number of hives in August, or September, when they are at the cheapest rate. They should be full of combs, and well stored with bees and honey; and should weigh at least 30lb. each; if heavier, so much the better; for light hives run a great risk of perishing by famine, unless the bees are supplied with food; which will cost as much expence, and a great deal more trouble, besides a considerable risk of their dying at last, after all this extraordinary trouble and expence. Whereas, a well chosen hive of 30lb. weight, allowing 12lb. for the empty hive, bees, combs, &c. will contain 18lb. of honey, which will supply the bees with food till next June; a time when, it may be presumed, they will find abundance of provisions for themselves among the flowers. When a choice can be obtained, the youngest hives should always be preferred, because old hives are liable to vermine and other accidents. However, although a hive should be four or five years old, it should not be rejected, if it possesses these two essential qualities, plenty of bees, and abundance of honey; but if either of these be wanting, the purchaser will have much cause of regret, when too late to repair the injury he may sustain.

Cover for Hives.—The same writer observes, that the best of all covers for hives that he has yet seen or heard of, are such as he ordered a potter to make for him, of burnt earthen ware. They are made in the form of a hive, pretty strong, about 21 inches wide, and 12 deep; with a circular edging turned up at the skirts, and a spout about an inch in length. These, being placed above the pob tow, or straw, keep it close to the hive, and may easily be taken off or put on at pleasure. The spout

being placed behind, all the water runs off at the back of the hive. The hives, when thus covered, may be compared to a man's head with a wig and hat upon it; the pob tow resembling the wig, and the earthen cover the hat. The only objection to these covers is, that they are brittle and easily broken; but the care that every good bee-master will readily bestow upon his hives in any case, is sufficient to preserve them from accidents of this kind.

Mr. Bonner also observes, that with regard to the profit arising from bees, one consideration should not be overlooked, viz. that almost the whole produce, arising from the sale of both honey and wax, is in a great measure clear profit; as bees and bee-hives are, particularly in Scotland, equally free from rents and taxes; and the culture of them does not in the least injure or impede any other improvement in any respect. Nor do they require a constant attendance, as most other articles of improvement do; for a proper person might easily oversee, with a little assistance in swarming time, at least 500 bee-hives. And as Nature has amply supplied them with food, and with powers to provide it for themselves, they put their owners to little or no expence for that article; which cannot be said of any other of our servants whatever. Thus, says he, by following the above plan, with a little attention and exertion on the part of our landed gentlemen, such a number of bee-hives would soon be raised all over the kingdom, that the quantity of honey and wax would be increased to such an extent, as to produce the greatest advantages to the nation at large, as well as to the private proprietors of the hives. All the money sent to foreign markets for these commodities would be kept at home; which would be a saving of perhaps no less than 50,000l. a-year; and honey would be produced in such abundance at home, as to supply the poor, as well as the rich, not only with a delicious *luxury*, but also with an excellent substitute for some *necessaries* of life. It might, for instance, be converted into *mead*, a fine well-tasted wholesome liquor, which would prove an excellent substitute for strong ale and porter, and could be sold at a very moderate price. A weaker kind of mead, called *bragwort*, could also be made of it. This is an agreeable, wholesome liquor, much esteemed by many, who use it as a substitute for small beer. When properly made, it will keep long; and when of a proper degree of strength, it is highly exhilarating. The increase of the quantity of honey would also reduce the price of it so much, that, instead of paying 10d. or 1s. per pound for it, as at present, it might be sold so low as 3d. per pound, in which case it would prove an excellent substitute for butter to the poor. Even at the present prices, it is already used by many persons mixed with butter. As to the wax, almost every person knows the great uses made of that article, in medicinal preparations, wax candles, sealing wax, &c. &c. as well as the high esteem in which wax candles and wax tapers are held by persons in the higher ranks of life, on account of their clear light and odoriferous smell, as well as their freedom from all danger of greasing, as tallow candles do, when a drop falls from them upon any thing.

Mr. Pitt's opinion, however, differs materially from the above. Some sanguine writers, says he, have conceived that very large products are to be obtained from the labours of these industrious insects. But of this I have great doubts: the climate of this island is not sufficiently steady even in summer; storms and showers often interrupt their labours, and at the end of the season it often happens that all their industry has not been sufficient for a winter's subsistence. They succeed best, he thinks, in straw hives, neatly hooded over with an upper coating of straw. In the autumn, those who have not raised a sufficiency of food for winter, it is doubtless humanity to destroy, as sudden suffocation is better than a prolonged but certain starvation; and sometimes a good hive or two are destroyed with the rest

for the sake of profit. But though the average annual profit of bees may be small, their cultivation, says he, is doubtless commendable, and ought to be encouraged.

On the most economical Consumption of the Produce of a Farm.

THE hints which have lately been thrown out by Doctor Anderson on this subject, in the third volume of his excellent *Essays on Agriculture*, are so ingenious and philosophical that we cannot refrain from laying a few of them before the reader in concluding this treatise.

After observing that nothing of this nature has yet been attempted in any work on rural economics, he says, "It may be admitted as a maxim, that agriculture can never be said to have been carried to its ultimate degree of perfection, so long as there is to be found one inch of ground that could be made to yield a single grain of greater or more valuable produce; so long as a single ounce of vegetable matter is allowed to go waste, or that has not been applied towards the sustenance of some useful animal, in the way in which it could produce its most beneficial effect; and while a single particle of dung or other manure is suffered to be misapplied, or so employed as not to afford the greatest possible resource it is capable of yielding, for the reproduction of additional crops of the most valuable kinds. That the highest degree of possible perfection should, in every case, be attained, is not to be expected in this imperfect state: but the nearer we approximate to it the better; and the more steadily we keep these objects in view, and the more strenuous our exertions are to attain them, we shall doubtless approach the nearer to these desirable attainments. So far, says he, are these objects, however, from being steadily held in view, in the present age, that one who attends to general practice in Britain, would be induced to believe they were scarcely ever adverted to, unless by a very few persons, and in regard to a small number of particulars only. Economy in the expenditure of the produce of a farm, like economy in the expenditure of capital in family affairs, seems indeed to be despised by many men, as indicating *poverty* of spirit, rather than wisdom, and is therefore studiously, as it should seem, avoided. There are, however, a few individuals, who have showed themselves to be above these prejudices, and who have not been ashamed to attempt to make some progress in different departments referable to this head of useful enquiry.

He observes further, in respect to economical arrangements, that was the subject to be considered in its utmost extent, as affecting the management of a farm, it would take a much wider sweep than that to which he means to confine himself in the present disquisition; which he tells us is solely meant to relate to the consumption of the crude produce of a farm by animals. He does not pretend, in what follows in this essay, to give absolute directions to the farmer what he ought to do, even on that part of the subject now under view. At the mere outset, in a business of such magnitude and intricacy, he remarks, the person who first attempts to open up the view, can do little more than act in the humble station of a pioneer, who clears away a few obstructions that may enable others, with less labour, to penetrate farther than he has done.

Dung much wasted under the common Practice of Pasturage.—The author says, that it is stated in the *Agricultural Survey of Gloucestershire*, that one acre of rye-grass, which had been sowed from Michaelmas to May, kept nine ewes and lambs *one month*. We may therefore, he says, safely conclude that the produce of the same field, from May till Michaelmas, would have been double to that it yielded during the winter half-year; consequently it could have sustained eighteen ewes and lambs *one month*. At this rate the acre of ground, tak-

ing the whole year round, would have afforded food for twenty-seven ewes and lambs for *one month*. These were large sheep, weighing about 25 pounds per quarter on the average.

And it is remarked in the *Survey of Wiltshire*, that 500 such ewes and lambs are sufficient to dung an acre each day when folded upon it: at that rate, says the Doctor, 27 of them should dung an acre in a little less than 19 days; consequently, in thirty days, somewhat better than half an acre more. He is however inclined to think this would be but a very moderate dunging; but should double the quantity of dung, or more, be required for certain purposes on particular occasions, it will not, he says, affect the conclusions deducible from these facts in *kind*, only in *degree*. Hence, in his opinion, it follows, that if none of this dung were suffered to go to waste, *an acre* of good land laid down to grass, in high order, should afford as much dung as would be sufficient to dress each year *an acre and a half* of other land.

And further, in the *agricultural account of Suffolk*, it is stated, that the rich marsh lands there keep at the rate of six sheep for seven summer months, and four for the five winter months per acre: that is, a little more than five sheep on an average per acre throughout the whole year. These are very large sheep, of which 800 would be equal to the 500 ewes and lambs above mentioned, and consequently would be sufficient to dung an acre in one day. But 5 times 365 makes 1825, the number of sheep kept for *one day*. At this rate, one acre of these rich grass lands would afford as much dung, in the course of one year, as should be sufficient to dung somewhat more than *two acres and a quarter* each year, if husbanded with due economy and attention.

But as the sheep in neither of these cases are folded, the dung is suffered to drop in a scattered manner over the pastures, throughout the whole year. In this manner, the influence of the dung must either be nothing, or it must produce *certain* effects upon the grass. If the last, what will these effects be? To this he says, it is well known that when sheep are folded upon grass ground, so as to deposit their dung upon it in considerable quantities all *about one time*, as in folding, the effect is, that a flush of grass is quickly produced over its whole surface, which is much more luxuriant and abundant than it would have been, had it not received this dressing. But it is equally well known, that the animals, whose dung has occasioned that flush of grass, nauseate it; nor can they be brought to taste it, unless they be compelled through hunger to do so; although animals of another kind are seen to eat that kind of grass (called in some places *goss*, in other places *toth*), not only without reluctance, but even with avidity and much eagerness.

He adds, that the extra flush of grass raised on the two acres and a quarter, that might be thus manured by the sheep fed on one acre, would be sufficient, on a moderate computation, to keep at the rate of two sheep per acre. By consequence, the extra grass produced by the dung of the sheep kept on one acre of this rich grass land, would be sufficient to keep four sheep and a half. But to keep within bounds, say *three* sheep only could be kept by the grass produced from the dung of the sheep fed on one acre. If the dung be supposed to have the same effect in producing extra grass, when dropped from the animals as they pasture on the field, as it has when laid upon ground closely, by means of folding, it must follow from these premises, that as much grass will grow from that dung upon each acre as would feed three sheep. But as the sheep will not eat this kind of grass without constraint, the ground must either be so hard stocked as to compel them, through hunger, to eat that nauseous food, or that portion of the grass which is produced by the dung, will be suffered to run to waste; so that, in either case, a considerable loss must be sustained by the owner.

This loss, he observes, may indeed be avoided, in as far as respects the consuming of the grafs only, by mixing different kinds of stock on the same field, while in pasture. For if these animals can be made to associate together, so as not to disturb each other in the field, the one set of animals will eat up the rank grafs produced from the dung of the others, and thus the whole will be eaten up without waste. This practice is indeed sometimes adopted in Suffolk to a certain degree, where the farmers are in use to put among their sheep a certain proportion of calves, or horses, which, in some measure, answer this end. But as the general practice there is to stock with sheep only, the loss to the stock itself, which must arise from this cause, would be very great, were it not obviated by a circumstance which indeed diminishes the evil, though this is in consequence of its producing another evil of nearly an equal magnitude and equally detrimental.

For, says the Doctor, if the dung, which is scattered about on the field, in small quantities, as it drops from the animals when pasturing upon it, were supposed to be incapable, in that state, of producing any sensible effect as a manure; or if that effect were very inconsiderable, in comparison of what it would otherwise have been, if applied all at one time, as in folding; in either of these cases, the nauseating quality of the grafs would not be experienced by the animals; or in such a degree only, as not to prove considerably hurtful to them: for, in this case, the dung proving inert, it would do little or no service to the ground, and in consequence of that, would prove not in any sensible degree hurtful to the sheep in feeding.

But that the above supposition is literally true, seems to be proved by the very fact which gave rise to these observations. If the dung thus dropped produced a melioration in any degree proportionate to what it would have done, if collected together, as in folding, its effects must have been extremely obvious in two respects; *first*, in augmenting the quantity of grafs produced on the field; and, *second*, in increasing its nauseating quality; neither of which, at present, are very obviously perceptible. In regard to the *first* particular, says he, every person knows, that if a dunging equal to more than double what is given by a good folding were laid upon even ordinary grafs ground, it would at once make the produce nearly equal to that of the rich grafs lands in question. And though it be true, that the effect of such a dressing upon poor ground would not be equally perceptible during the second year as the first, yet it would still be very considerable; inasmuch that, although no other dunging were given to it, and the crops were constantly cut and carried off from the field, it would not return to its former state, but would continue to afford much better crops than before it received the dressing, even for the third, and many succeeding crops. If the same dunging, then, were annually repeated, and if a similar effect were to result from each repetition, the quantity of produce must go on continually augmenting in a very rapid degree from year to year. But as no such rapid melioration is here perceived, we are, says he, forced to conclude, that the dung which is *thus* applied produces not the effect it might, under good management, be made to do; and that consequently an unnecessary waste is thus incurred.

But further, if it should be alleged, that when land is once brought to a certain degree of productiveness, it can be made to yield no more produce, were it to be dunged ever so often; and that its richness could not be augmented even by folding itself, no more than it is observed to be by pasturing upon such land;—the want of economy, in suffering the dung to be thus applied, would be even perhaps still more obvious than in the case before stated. For if the dung produces *there* no good effect whatever, there can be no doubt but it would produce a very powerful effect, if properly applied to ground of a poorer

quality: so long, then, as such ground is to be found, those who suffer their dung to be so applied, must be held guilty of very great mismanagement, and of course should make haste to correct such a practice.

And the other circumstance above noticed is a corroborative evidence, that the dung thus laid on the field is allowed to waste itself in a great measure without effect: for, had the nauseating quality of the grafs been *nearly* as great as we know it must have been, if such a proportion of the grafs had been forced by the dung of the animal which is set to consume it, this dislike in these creatures must have been so great as to be at once perceptible to every person; and must have *compelled* the farmers *universally* to adopt strong and decisive measures to guard against it: but as no such peculiarity is generally recognised, we are forced to conclude that, if it does exist at all, it is felt but in a very inconsiderable degree; and consequently that the great quantity of dung which is dropped upon these fields, operates not upon them in any sensible degree as a manure. If these observations be well founded, says the Doctor, what an amazing waste is sustained through the whole nation, by the loss of the dung that is thus uselessly scattered on the surface of pasture fields every where!

He tells us, that he is aware of the prejudice that is very generally entertained in favour of the benefits that grafs land derives from the dung which is dropped by the animals that pasture upon it. But although he has searched diligently for a fact, or an argument grounded upon facts, to support this opinion, he is forced to declare that he has not been able to find one in support of it; but, on the contrary, many, besides those above stated, which militate against it. He is therefore compelled to rank this as one of that numerous class of opinions which have been at first casually adopted, and afterwards cherished, by a prejudice derived from habit rather than from reasoning of any sort.

For, says he, had this opinion been well founded, it must necessarily have happened, that in every case where grafs-land has been long pastured upon, without folding, the quantity of its annual produce must have been sensibly augmented. That this has not been the case, we need only to open our eyes to be convinced of. It is only necessary to notice the immense numbers of poor grafs fields in every part of this kingdom, which have been pastured from year to year without interruption, perhaps for ages past, and which discover not the smallest tendency to melioration of any sort, whether the quantity of produce within the utmost stretch of the memory of man, or the rent that has been paid for them (the alteration in the value of money being adverted to), be considered as the standard. He himself knows many fields which, under certain circumstances, have grown evidently less productive than before, though perpetually pastured upon. The forest of Dartmoor in Devonshire, and other such extensive moors of a barren nature, in many other parts of England, though every year stocked in summer with more beasts than the produce can properly sustain, do they discover the smallest tendency to melioration even till this hour? But there can be no doubt, that if all the dung which has been dropped upon these wastes had been properly husbanded, a great and sensible melioration on them must have been effected many ages ago.

But, says he, taking the converse of the proposition above stated,—Were it true, that the dung which is dropped upon pastures tended sensibly to meliorate them, it must follow that those pastures from which the dung is constantly abstracted by folding, as on Marlborough downs in Wiltshire, and many other places, must either have grown worse in the course of ages, even where it had not been touched by the plough; or at least must have advanced much more slowly in their melioration, than other grafs lands, equally untouched by the plough,

from which no dung has been abstracted. Is this the case? I have not met with a single fact which tends to show that the present produce of the parts of those fields which have never been ploughed, when compared with that of former times, differs in any respect from that of other fields of a similar nature, from which no dung has ever been carried away by folding. He is therefore forced to conclude, that in all cases where animals are allowed to feed on pastures of any sort, the dung which is dropped from them is, in a great measure, lost as a manure; and a rigid economy would require that measures should be adopted for preventing this waste, if it can be done without occasioning evils greater than that which it is intended to correct or prevent.

The Folding of Sheep economical.—The Doctor here observes, that the remedy which first presents itself in this case, is that of folding; and that, if properly managed, there are perhaps few cases in which it might not be put in practice, not only without detriment to the stock, but even perhaps in some cases to their advantage.

All animals, but especially those that ruminate, choose to feed and rest by turns. Ruminating animals require much time for rest; and the more quiet they are allowed to be during that period, the better they will thrive. If these then are withdrawn from their pastures after they have properly filled their belly, and when they become necessarily disposed to ruminate, they can sustain no damage from being then put into a place where they can have no access to food. And if they be only as long detained there as till they have rechewed the food they had swallowed, and begin to feel an inclination to eat more, they will even be benefited by this confinement, rather than otherwise. And they will thus all feed and rest at the same time.

Penning, however, under injudicious management, may tend to retard the feeding of the animals subjected to it. If the creatures be driven to a great distance from their pastures to the pen, it must subject them to a hurtful degree of fatigue; and this will be increased if they must be made to pass through narrow lanes, where they may be crowded and incommoded by passengers; or where they cannot avoid being at times mired in dirt, or drenched in wet: or if they be neglected too long in the pen; or put up at improper times, &c. Therefore, says he, to derive the full benefit from folding, it would seem, that where the pastures are of a great extent, there ought to be two or more folds placed close by the pasture, at convenient distances from each other; so that the flocks being gently conducted from one towards the other, feeding all the way, might find themselves, when full, just at the place into which they might retire for rest. There they should be suffered to remain just so long as is found by experience to be necessary to complete their ruminating process, and to prepare them for feeding afresh: they should then be suffered to rise and stretch themselves, when they naturally void their dung and urine on the spot. Thus will the dung be preserved, and the pastures be kept clean and sweet. They ought then to be led gently to the fresh pasture which they had not lately breathed upon, or trampled with their feet, and which of course will be to them sweet and inviting; they should thus be slowly conducted to their next resting place, feeding all the way; and so on till they go over the whole in a regular succession. If experience shall discover that diseases are produced by suffering the animals to eat their food when covered with hoar frost, or dew, or mildew, or at certain times of the day or night, when snails or other creatures are abroad, which they may swallow with their food; in all these cases, when observed, the evil may, by an attentive economist, be avoided by means of a judicious use of the fold. He may, also, by the same contrivance, withdraw the creatures from the pastures at those times

when they become restless and refuse to feed. In short, a judicious economist, by having folds properly situated, respecting the circumstances of shelter, coolness, water, and other conveniences, may avail himself of these for greatly promoting the health and enjoyment of the animals, and thus accelerating their feeding; so that, independent of the benefits he shall derive from their dung, he will in other respects reap considerable emolument.

Here the Doctor enters into some reasonings and calculations respecting the greater progress and improvement that might be produced on land by these means, under a judicious system of management, than by suffering the produce to be consumed by animals allowed to pasture at large, for which we must refer the reader to the Essay itself.

From the whole he however concludes, that dung dropped upon a field in pasture either produces no effect whatever, or an effect far less considerable than it might be made to afford under a more judicious system of management; and that, if it has any effect at all upon the pasture, it must be that of rendering the food yielded by these pastures less palatable, and less nourishing to the animals that feed upon it, than it otherwise might have been.

The Utility of hard or light Stocking of Pasture Ground.—The Doctor observes, that some persons contend that the pastures ought to be stocked very lightly; alleging, that although much of the produce is thus allowed to run to seed, which the beasts will not eat, and which of course is trod under foot, and rotted by rain, and thus wasted; yet experience, they say, proves, that a greater profit will be thus derived from it, upon the whole, on account of the superior thriving of the animals, than by any other practice. Others pretend, on the contrary, that light stocking of grass land is a practice highly to be condemned; as it tends not only gradually to diminish its produce, but also to encourage the growth of coarse and unprofitable grasses, which greatly deteriorate the pastures; and that hard stocking of grass lands, especially those of a rich quality, is an indispensable requisite of good management. These two opinions, so diametrically opposite to each other, and which are equally maintained by sensible men, he thinks clearly prove the embarrassment to which they are subjected, in consequence of their not having adverted to the circumstances stated above, and many other particulars that require still to be developed, as affecting the economical consumption of the produce of lands in grass.

He further remarks, that a third party, who approach perhaps nearer to the truth than either of the above, advise that a mixed flock should be always kept upon the same field; and that were the consumption of the foul grass produced by the dung of the animals, the only article to be adverted to, it might be, doubtless, so managed as to correct this evil. But there are so many other circumstances to be adverted to, that it is not easy by this means to get them all remedied. In every field, a variety of plants spontaneously spring up, some of which are disrelished by one class of animals, while they are eaten by some others; and some of which plants, though eaten readily by some animals at a particular period of their growth, are rejected by them entirely at another age. Thus it becomes necessary, not only to have a vast variety of animals in the same pasture; but also a very particular attention is required to augment or to diminish the proportion of some of these classes of animals, at particular seasons of the year; otherwise some part of the produce will be allowed to run to waste, unless it be hard stocked to such a degree as to retard their thriving. But if a great variety of animals be allowed to go at large in the same pasture, they are never suffered to feed with that tranquillity which is necessary to insure thriving in the highest degree. One class of these wishes to feed, or to play, while the others

would incline to rest. They thus mutually disturb and tease each other; and this inconvenience is greatly augmented, if penning of any sort be attempted. From these considerations, the practice of intermixing various kinds of stock very much together, is found to be productive of evils, in many cases, greater than those which result from the waste of food they were intended to prevent. And though there can be no doubt that by hard stocking the grass will be kept shorter, and consequently will be more palatable in general to the animals who eat it, than if it were allowed to run to a great length, and that thus even unpleasing patches may be consumed; yet as animals which are to be fattened must not only have sweet food, but an abundant bite at all times, to bring them forward in a kindly manner, it seems to be nearly impossible to obtain at the same time both these advantages in the practice of pasturage.

Of cutting and consuming the Produce in the House.—Might not these evils, says the Doctor, be greatly diminished, if not entirely remedied, in many cases, by having the produce cut by the scythe, and given to the animals fresh in the house; rather than to suffer them to go at large and eat the produce on the field, even under any system of management whatever? Many arguments, he thinks, tend to show, that this practice would be, in general, highly economical and advantageous. In the first place, says he, if the consumption of the plants be the object principally attended to, it is plain the benefits will be great: for experience has clearly proved, that there are many plants which are greedily consumed by beasts, if cut and given to them in the house, which never would be touched by them when growing in the field. Of this nature is the dock, cow-parsley, thistles, nettles, and many other plants. Upon what principle it should happen that these plants should be so readily eaten, when thus given, while they are totally rejected when in the field, he cannot say: but that they are thus eaten, without reluctance, even when the animal is not hurtfully hungry, is evident from this circumstance, that the beasts often fall greedily to these at the moment they are brought in from the field, even before they have had time to become hungry after they had come in. Fewer plants would be rejected or suffered to go to waste on this plan.

And in the second place, It is well known that many of even the best kinds of grasses, which when young form the most palatable food for the creatures, if once suffered to get into ear, are disrelished so much as never to be tasted by them unless to prevent starvation; and as, in most pasture fields, many of these grasses get into ear from various causes, all the produce of these plants is inevitably lost to the farmer. But if cut down by the scythe, in proper time, not one of these is ever suffered to get into that nauseating state; and consequently no waste is suffered.

Thirdly. But when animals are suffered to go upon the field, many of the plants are trodden under foot by the beasts, and bruised or buried in part in the earth; in which state they are greatly disrelished by animals, and are suffered to run to waste; which never could take place were the practice of cutting adopted generally.

Lastly. It may be observed that those few plants which are totally disrelished by one class of animals, so as to be rejected by them even in the house, will not, from this circumstance, become less acceptable to others, but much the reverse. Food that an animal has breathed upon, for any considerable time, becomes unpleasant to other animals of the same class; but not so to those of another species: it seems indeed thus to acquire for them a higher relish. Even greater defilement by one animal, seems to render food more acceptable to others: for straw, that in its clean state has been rejected by cattle, if employed as litter for horses, acquires a relish for cattle that

they search for with avidity. Hence it happens, that the sweeping of the stalls from one animal, furnishes a dainty repast for those of another kind; which can easily be shifted from one to the other, if the plants are consumed in the house, but which must have been lost in the field.

If, says our author, *the health and the comfort of the animal* be chiefly adverted to, the balance will be clearly in favour of the cutting system, when compared with that of pasturing. It is well known that when animals are exposed to the sun, in the open air, they are not only greatly incommoded on many occasions by the heat, but also are annoyed by swarms of flies, gnats, and hornets, as well as the terrible gad-fly, which drives them into a state of perturbation little short of fury, which must obviously tend to retard their thriving. At other times they are hurt by chilling blasts, or drenched by cheerless rain, which renders their situation very unpleasing, and greatly retards their feeding, as is well known. Under proper management, in a well constructed stall, all these evils would be alike removed, and they would be kept perpetually in a proper state of coolness, tranquillity, and ease, so as to make the same quantity of food go farther than it otherwise could have done in nourishing them. They would also be prevented from licking up snails, worms, and other noxious creatures, among their food, which they are by pasturing apt to do, when they feed at those times of the day, or night, when these creatures crawl abroad. This would be entirely avoided by cutting the grass at those times of the day when none of these are to be found. Thus lingering diseases might often be avoided, which always retard the thriving, and often prove totally the destruction, of the animal. And by giving an opportunity of administering dry and nourishing food, along with the soft and succulent, where circumstances require it, in any requisite proportions, and by varying the tastes, so as to provoke an appetite, not only the health, but the thriving of the creatures, would be greatly augmented beyond what they could have been in any other way.

But if *manure is to be chiefly* attended to, there can be no comparison between the two modes of consumption. This is so greatly in favour of stall-feeding, that it would be idle to spend time in searching for proofs of a proposition that may be considered as self-evident and certain.

And lastly, If the *quantity* of herbage produced from the same field be adverted to, it will be found to be equally in favour of the cutting system. It is well known, that all animals delight more to feed on the young fresh shoots of grass, than those that are older. Hence it invariably happens, that those patches in a pasture field that happen to have been eaten once bare, in the beginning of the season, are kept very short ever afterwards throughout the whole of that season, by the creatures delighting to feed upon them in preference to the parts of the field that have got up to a greater head; so that these last are suffered to remain in a great measure untouched throughout the season. It is not however in general known, that grass, even the leafy parts of it, when it has attained a certain length, becomes stationary; and, though it will retain its verdure for some months in that state, makes no sort of progress whatever; whereas, if it had been cropped down frequently, it would have continued in a constant state of progress, advancing with a rapidity in a great measure proportioned to the frequency of its being cropped. For experimental proofs of this fact, (see our author's *Essays on Agriculture and Rural Affairs*, Vol. II. Disquisition V.) From his own experiments and observations, the Doctor is satisfied that, in some cases, the actual produce of the same field, by a judicious management *in this respect*, compared with bad management, may be augmented *fourfold* in the same season. It is owing to this circumstance, though the reason of the fact has not been understood, that

hard stocking of pasture lands has been found to enable the same field to sustain a much greater weight of stock than it could do when lightly stocked. But under no system of management can the evil of unequal cropping of land under pasturage be avoided, unless it be by a destructive degree of hard stocking; which must be avoided where the animals are expected to thrive. By cutting with the scythe frequently, so as to keep the grass always short, and therefore in a state of continual vigorous vegetation, all these evils are avoided. The quantity of produce will be raised to the *maximum* that the land, in its present state, is capable of producing, while the stock to be fed by that produce needs not be in the smallest degree stinted in point of food. Therefore, under every point of view that this question can be considered, we are forced to conclude that the practice of cutting grass, and consuming it green, in all cases where the ground is in a state that can admit of it, when compared with that of pasturage, appears to be so greatly economical, that the particulars under which that mode of management can be practised, and the peculiarities affecting it, deserve to be much more minutely investigated than has ever yet been done.

He adds, that in confirmation of the justness of this conclusion, it is now universally admitted as a fact, confirmed by innumerable experiments, that a crop of red clover, when cut, and consumed in the house green, goes in all cases much farther in feeding beasts, than when it is consumed by pasturage upon the field. The lowest estimate that he has ever seen made on this head, from actual experiment, is, that it will go at least twice as far when cut, as when pastured upon: some go as high as to say it will go *four times* as far. As every person who has tried the experiment agrees that the saving, by cutting this crop, is very great, that practice has of late years begun to prevail very much; though reason has not yet been able so effectually to stem the torrent of ancient prejudice, as to render it general.

However, the practice of cutting other grass grounds, and consuming their produce green, seems not yet to have been deemed even practicable, and has not of course been ever thought of being experimentally tried, although he has reason to be satisfied, from some experiments that he has made, and the considerations above stated, that the benefits to be derived from consuming the produce of rich grass lands *of any sort*, in this way, will be even greater than that which takes place in the case of the red clover, as just stated. The circumstance, says he, that made me first advert to those benefits that might be derived from consuming grass land by cutting, in preference to pasturage, was merely accidental. It was from the experiment of frequently cutting a grass walk, and giving the produce to his cows.

This experiment, he tells us, first suggested doubts in his mind, as to the propriety of consuming *rich* grass lands by pasturage; and every observation that he has since made, has tended so strongly to add to his conviction, that he has now not a doubt remaining upon this head: and he conceives that the loss which is annually sustained by the nation at large, from an inattention to this circumstance, is so great as, in some measure, to call upon him to publish these remarks, with a view to direct the attention of others to investigate the subject with greater care than it has hitherto obtained.

After suggesting the means of determining this point by actual experiment, for which we must refer the reader to the work itself, the Doctor proceeds:

Grass lands, when constantly cut, are not deteriorated.—The Doctor observes, that what the changes would be, both in regard to the quantity and the nature of the produce from the same field, if annually cut, and the produce carried off, or if consumed by suffering beasts to pasture upon it, cannot at pre-

sent be told with certainty; but there are not wanting *facts*, that may enable us to have some idea of the probable result. It has been rendered probable, at least, from facts already stated, that dung, when dropped upon land by cattle pasturing upon it, does not tend to enrich it perhaps at all; or, if it does so, it is only to a very small degree. Whether rich grass land, if constantly cut, and the produce carried off from it, will thus, in time, come to produce crops less abundant than the same land would have done, if kept under pasturage, will not, with many persons, seem to admit a doubt. Yet there are considerations, says the author, which so strongly operate upon my mind for doubting if this be the case, that nothing short of actual experiment can remove them. I have often, says he, seen lawns around gentlemen's houses that have been under a course of continued shaving for time immemorial, that discovered no symptoms of exhaustion, nor any sensible diminution of luxuriance or of verdure, though no manures of any sort had ever been laid upon them. This fact struck him as an important one; and that he might not be mistaken with regard to it, he applied for information respecting this particular, to a gardener who had had charge of very extensive lawns of this sort, belonging to a gentleman of large property. He assured him, that for the space of upwards of thirty years, that he had had the care of these lawns, some parts of them which had been laid down long before he knew them, and were originally, as he supposed, of a rich quality, had never received during all that time the smallest quantity of manure of any sort; and that the lawn continued to be equally close in the pile, equally verdant at all seasons in the year, and required to be as often cut as ever; and that, in short, he had no reason to apprehend that the quantity of its produce had diminished in the smallest degree. This seems to our author a strong presumptive proof that grass land, when once of a rich quality, may be continued for an indefinite length of time under the scythe, without being at all deteriorated, even where it gets no return of dung that is annually made from the produce of it. And as the Doctor has shewn that rich grass land, under pasturage, produces as much dung as ought to manure each year more than double its own extent of surface; it follows, that if the same quantity of grass land will only nourish as many beasts in the house, as if it were pastured upon (and there are strong reasons for thinking it will do much more), there can be annually obtained from each acre of land kept under the scythe as much dung as might manure two acres more, which might be abstracted from that grass land without deteriorating it. Of course, if the land be such as that it can admit of being made richer, a dressing of that dung, now and then returned upon itself, would give it the richness wanted, without any extraneous aid. In this point of view, then, it seems to be impossible to deny that rich land, if kept under the scythe, can never become poorer, if none of the dung made by the beasts fed upon it be abstracted from it; but that, on the contrary, it can thus be made to afford a large annual supply of dung for the purpose of enriching poorer land, while it still continues to be fertile itself in the same degree.

He also remarks, there seems to be no doubt but that the *quality* of the grass must continue to improve while under the scythe, much more than while under pasturage. Every person, says he, who has bestowed the smallest attention to objects of this sort, must have remarked that the worst kinds of grasses grow most freely upon those parts of rich grasslands that are the most open and spongy in their texture; and that they are in general much sweetened in the pile where they chance to be much trod upon. Hence the finest grasses on such fields are always found to abound most upon those paths which are moderately trod upon; white clover and the sweetest grasses being seen there in abundance, while they are less frequent in the

spongy parts of the field. But frequent rolling tends to produce this effect more universally and equally than any kind of treading by beasts (a practice frequently recommended by the best farmers) can ever accomplish.

In confirmation of his opinion, the Doctor quotes the observations of Mr. Davies, as given in his account of the Agriculture of Wiltshire, who says, that "the sweetness of the feed depends much more on its being kept close, *and eaten as fast as it shoots*, than on any peculiar good quality of the grass itself: for there are many downs that, when close fed, appear to be a very sweet pasture, but which, if suffered to run a year or two without a full stock on them, will become so coarse, that sheep *will almost as soon starve as eat the grass*: and even in those parts of the downs, where the finer and sweeter grasses abound, the soil is frequently so loose and porous, that nothing but constant treading will prevent them from dying out, or being choked by the larger and coarser grasses." They also, he observes in another place, say, "that this new kind of sheep being so much nicer in their food, and rejecting the feed of the downs, on which the chief dependence for sheep food is, have suffered the herbage to grow gradually coarser and coarser; and that the farmers, in attempting to remedy this evil by shortening their stock of sheep, have made it worse; it being a well known fact, that *the closer the downs are fed, the more stock they will keep*." It is likewise farther remarked by Mr. Davies, that in consequence of too light stocking, heath, in some cases, comes in the place of the better grasses. But, says the Doctor, it is very evident that all the purposes of hard stocking, that is, keeping the grass short, and in a continual state of vegetation, and consequently sweet, and preventing the coarser grasses from running up to stalk and overpowering the others, together with the consolidating of the ground by treading, would be obtained with much greater certainty by the practice of mowing; while the animals that consumed the produce could in no case be subjected to a stint of food, which they necessarily must sometimes be, where reliance is had upon hard stocking alone for preventing this evil. From these considerations, he says, there seems to be good reason to believe, that not only an equal quantity of produce would go farther, if cut and given green to beasts in the house, than if it were pastured upon, but that, by a continuation of this practice for years, the ground kept under the scythe would gradually improve, so as to produce a greater quantity of food, and that also of a richer quality, than if it had been kept under a course of pasturage; while, at the same time, a great quantity of dung might thus be acquired for the purpose of fertilizing other soils of a poorer quality. The reader, however, says the Doctor, will please never to forget, that though this reasoning be very *probable*, it amounts not as yet to a *certainty*; nor can it ever do so, until some decisive experiments shall be made to ascertain with precision the facts that are as yet but very imperfectly understood.

Sweetness of Pastures, what.—The Doctor observes, that the term, *sweetness of pastures*, used above, and *sweet kinds of grass*, frequently occur in agricultural writings: yet it is doubtful, he thinks, if ever they have been properly defined, so as to convey a precise and accurate meaning to the reader, or been so much adverted to as their importance deserves. He therefore here attempts to supply these defects. Those pastures which animals choose to feed upon in preference to others, and which in general are eaten down close to the ground, are said to be *sweet pastures*, in contradistinction to those where the grass, being disrelished, is suffered to grow to a greater length, and often to wither in part, without being touched; which are called *coarse*, or, if tending to dampness, *four pastures*. Without entering into a disquisition concerning the circumstances that tend to produce this sweetness of

pasturage, which are various, he observes, that from whatever cause it originates, it is in as far as he knows an universal rule, that in every case the younger the grass is, the sweeter and more palatable it will be to beasts of every sort; and that the same weight of food will go much farther in nourishing or fattening an animal, if it be very pleasing to the palate of the animal to which it is given, than if it had been less toothsome. For, as a certain quantity of food is required for the mere sustenance of every animal, if that quantity be daily administered to it, and no more, the creature will barely subsist, and neither grow better nor worse, if fattening alone be considered; and of course will never return, in the way of fattening, any profit to the farmer for that portion of its food, however long it may be continued upon it. But if the beast shall get a greater quantity of food than this portion which is barely necessary for subsistence, that surplus food then goes to augment the size, and to *fatten* the animal, and of course yields a profit to the farmer in proportion to its quantity. If this fact be admitted, he thinks it will necessarily follow, that the greater the proportion of this surplus food the creature can be induced to eat in a given time, the more quickly it will be fattened, and, of course, the greater will be the profit of the farmer.

From some calculations here introduced, the Doctor concludes that the same quantity of food, which would sustain no more than *one* beast, if it were so sparingly administered as to require a whole year to fatten it, would be more than sufficient to fatten *four*, if they could be induced to take it in such quantity as to fatten in six weeks only. But as it is hunger alone that can induce any animal to eat such kinds of food as are unpalatable to that creature, it is impossible to get the animal to eat more of coarse unpalatable kinds of grass, than what is necessary for bare subsistence only; so that such fields must be appropriated to breeding only, because, in the way of feeding, they can return no profit whatever to the farmer, by a kind of stock which disrelishes that food. If it be a little sweeter, they may get on a little; but the profit, in this case, will be very small. Render the grass more sweet and palatable, they will fatten the more quickly, and the farmer's profit be thus augmented: and so on almost in a geometrical *ratio*, in proportion to its augmented sweetness. Under this point of view, whatever tends to render the produce of fields more sweet and palatable to the animals which feed upon it, is a very great national improvement; because it answers the same purpose that a large augmentation in the quantity of the produce would do. But if the *quality* can be improved at the same time that the *quantity* can be augmented, it will be a twofold gain, and the greatest national benefit will thus be obtained. But as it has been already shown that every kind of grass will be rendered as palatable as it is possible to be, by being cut and given to them in the house, while the quantity of its produce will, at the same time, be thereby augmented, it seems to be impossible to doubt that the practice must be highly economical. He here says, it is well known that very rich land in general produces the sweetest pile of grass; and that calcareous manures in particular have been remarked as being peculiarly calculated for producing this effect. It hence follows, that it is the best economy to lay lands down to grass while they are still in the most fertile state, before they have been exhausted by frequent corn crops, especially after liming. Land may certainly be made too rich for corn crops; but he does not know if that can be the case with grass land, under proper management.

Here the Doctor, after guarding the reader against the possible error of his *illustrative* calculations, observes, that he knows of no fact that has been yet brought forward, which clearly ascertains whether the degree of melioration is exactly in proportion to the *surplus* food of any sort that an animal

can be brought to eat in a given time, though the probabilities are greatly on that side. Neither does he know if it be an universal rule, when animals of *different kinds* are compared with each other, that those kinds which can be made to eat in a given time the greatest quantity of food, can be the soonest fattened. The subject has never as yet, that he knows of, been properly attended to.

The Importance of Condiments on Domestic Economy.—Little attention has hitherto been bestowed on the subject of condiments as affecting animals. Hitherto, says the Doctor, the greatest part of mankind seem to forget that mere animals have the sense of tasting in as great perfection as man; and are disposed to indulge their appetite for sensual gratifications, without any restraint, wherever circumstances put it in their power. The uses that may be made by man, for his own emolument, of this natural propensity of animals, are very obvious when adverted to. Yet I know, says he, no case in which the general attention of men seems to have been strongly turned to that point, unless it be in respect to the fattening of calves: for I have met with few persons who have had an extensive practice in this department, who are not sensible that the profit is in proportion to the quantity of milk that the creatures can be induced voluntarily to take in a given time. This solitary fact is known by thousands, who never once think of extending it to any other case of animal existence. But there are not wanting a few persons, who, in consequence of accurate observation, have discovered the vast importance of studying with care the taste of the creatures they feed, that they may not only furnish them with the kinds of food they like best, but also to vary these from time to time, and to give them exactly in the quantities, and in the way that they find will induce the creatures to eat the most; having the full experience, that the profit to be drawn from feeding beasts is always proportioned to the increased quantity of food they can get each individual *coaxed* to consume in a given time. The cramming of poultry is also another instance of the economy that arises from the principle here alluded to being adhered to even by *force*. In this branch of rural economics, our author has met with no person who has made greater progress than a plain practical farmer at Hope, in the neighbourhood of Manchester, who spares neither trouble nor expence in procuring such kinds of food and condiments as he finds best calculated to induce his cows to consume, in a given time, the greatest quantity of food possible. Among other condiments, this man has discovered that *pure* water stands pretty high in the scale; on which account his beasts are never suffered, far less obliged, to taste a drop of water that has ever been sullied by any animal setting a foot into it. With this view, they are always served with running water, which is, for their convenience, received into a long wooden trough, through which it passes while they are drinking. Such poor beasts as are compelled through necessity to drink out of those muddy stagnant pools, in which other cattle have waded for days together to cool themselves in hot weather, which are fully impregnated with their dung and pifs, feel the inconvenience of this nauseating draught; and the farmer of course suffers an abatement of his profit to an astonishing degree.

Value of common Salt in feeding Beasts.—Our author remarks, that there is no substance yet known which is so much relished by the whole order of *graminivorous* animals, as common salt. The wild creatures of the desert are so fond of it, that wherever they discover a bank of earth impregnated with a small proportion of salt, they come to it ever after regularly to lick the saline earth, as they would to a pool of water for drink, were there none other near; so that when a hunter in America discovers such a *lick*, as such places are there called, he reckons himself sure of obtaining plenty of game, by lying in

wait near it and shooting them as they approach it, until the whole beasts that have discovered it are destroyed. It is also admitted by all those who have tried the experiment, that salt given along with the food of domestic animals, except fowls, to which it is a certain poison, tends very much to promote their health and accelerate their feeding; and although some persons, who have been at a loss to account for the manner in which this stimulant could act as a nutritious substance, have affected to disregard this fact, yet no one has been able to bring the slightest show of evidence to invalidate the strong proofs that have been adduced in support of it; though, unfortunately for this country, few experiments of this kind have been tried in it. In fact, we have no reason to suppose that salt acts in the smallest degree as a nutritious substance, or, *of itself*, tends to fatten any animal; but that, merely by acting as a condiment, it whets the appetite, and gives the creature to which it is properly administered a strong relish for its proper food, so as to induce it to eat a greater quantity than it would have done *in a given time*, and thus greatly to augment, as has been above explained, its feeding quality beyond what it otherwise could have had. In this way, it is not perhaps an extravagant position to say, that by a proper use of common salt, the same quantity of forage might, on many occasions, be made to go twice as far as it could have gone in feeding animals, had the salt been withheld from them. If so, we have here laid open to our view an easy mode of augmenting the produce of our fields to an amazing extent: for, if the same quantity of forage can be made to go, not twice as far, but *one-twentieth* part only farther than it now does, it would be the same thing as adding one-twentieth part to the aggregate produce of meat for beasts, throughout the whole kingdom. But, according to the estimate of the President of the Board of Agriculture, there are upwards of fifty millions of acres of *cultivated* land in this island; the value of the forage produced by which cannot, on an average, be rated so low as twenty shillings per acre; but even at that low rate, the addition of one-twentieth would amount to 2,550,000*l. per annum*; a sum so great, that, when viewed in the aggregate, it is difficult to bring the mind to believe that such an improvement is actually practicable: yet, when the particulars are considered in detail, it seems to be impossible not to admit that the amount of the improvement must be greatly above the statement here given. The salt laws however operate very strongly against improvements in this way.

Best Mode of obtaining Hay of a fine Quality.—As in this climate, where grass does not continue to vegetate luxuriantly throughout the whole year, a provision must be made for winter food for beasts; and for this purpose, on grass farms, it becomes necessary, in all cases, to appropriate a proportion of the land for hay; it becomes then a consideration of some importance, to enquire in what way hay of the best quality can be obtained in the greatest quantity, and at the least expence that the nature of the case will admit of.

From the considerations above stated, it is evident that it is a matter of much greater consequence than has been generally imagined, to take care that the hay shall be of the very best quality possible; because one stone of hay of an exceeding fine quality may probably go as far in *feeding* beasts as four of an inferior quality will do. So little attention is in general bestowed upon this subject, that few farmers have even an idea of the circumstances that chiefly tend either to improve the quality of their hay, or to make it worse. For the most part, all that seems to be aimed at is, to get the grass as quickly dried as possible, so as that it may admit of being kept, when put up in a large mass together. And as grass, that is already withered before it be cut, can be more easily dried than that which is very green and succulent, it is too general a practice

to allow it to advance too far before it be cut ; in consequence of which the hay is rendered of a quality much inferior to what it might have been. The judicious remarks of Mr. Davies, in his account of Wiltshire, are here introduced.

“ The dairy farmers (he observes) in North Wiltshire, and in particular the graziers, are much more attentive to the quality than the quantity of their hay. It has been already remarked, that they make a point of haining up their meadows as early as possible in autumn, and of course are able to mow early in the summer.

“ It is not uncommon to see grafs mown, not only before it is in blossom, but even before it is *all in ear* ; and to this it is owing that it is more common to fat cattle with *hay alone*, in North Wilts, than perhaps in any county in the kingdom.

“ And by this the dairy-men are able to keep up the milk of those cows that calve early, and from which calves are fatted, which would otherwise shrink before the springing of the grafs, and never recover. And the advantage they get by early after-grafs, and by the duration of that after-grafs to a late period in autumn, fully compensates for the loss of quantity in their hay crop.”

Doctor Anderson observes, that nothing is here said as to the mode adopted for *winning* the hay ; by which is meant the process of converting succulent herbage into a state of hay that can be kept in quantities, on which its quality must always greatly depend. It is in general understood, that if hay can be made so as to retain some tinge of its green colour, it is better than if it were bleached white, or rotted : but precautions are seldom thought necessary to be adopted for guarding against the effects of scorching sun-shine, which, by too quickly exhaling its natural juices, renders it sticky, brittle, and unpalatable to a certain degree ; and, what is of still more importance, the effects of rain, or even dew if abundant, if they are suffered to fall upon the grafs after it is cut and before it be made into hay, are seldom adverted to ; so that if dry weather comes soon to exhale that wet, while the grafs lies spread out upon the ground, the farmer feels little anxiety about the consequences ; though it is a certain fact that no hay, which has been in the least wetted during the process of hay-making, can ever be made to have that sweet palatable taste it would have had without it. Nor has our author ever seen that beasts, when allowed to choose between hay so made and that which has been carefully guarded from moisture, ever hesitated to make choice of the last, or committed a mistake, even where he himself could not distinguish a perceptible difference. But in order to obtain hay in all cases of the very best quality the circumstances will admit of, the following process, he says, may be safely conjoined with the practice of cutting and feeding beasts with grafs in the house, as above recommended. Where the produce of grafs land is to be cut, as above described, and used green, it will be proper in general to reserve a part of it for hay. In this case the cutting for *grafs* and for *hay* should be carried on together ; but with the following variations, depending on the uses it is to be applied to. That part of the grafs which is intended to be used green, as it will suffer no damage by being cut when wet, must continue to be cut regularly each day as it is wanted, without regard to the weather ; whereas that part of it which is intended for hay, ought on no account to be cut while wet ; and therefore that part of the operation must be discontinued, unless when the weather is dry and fine ; nor should it ever be cut either in the morning or the evening, while dew is upon it. And as the hay, in the mode proposed, ought to be made day by day, for a continuance, as the grafs comes forward for the scythe, while the weather is in a proper state for it ; and not all at one time, as in the usual mode of hay-making, the cutting both grafs and

hay from the same field may be very economically combined together. For this purpose the grafs which is cut in the morning, while the dew may perhaps be upon it, and in the afternoon, ought to be appropriated to the beasts green ; and that part of the grafs only which is cut from nine till two o'clock, while the weather is dry and fine, should be made into hay. If the mower begins to cut down for hay about nine o'clock in the morning, and goes on in that operation till one or two in the afternoon ; and if the persons who are to put up the hay begin to that operation about one, the grafs will thus be allowed to lie between three and four hours in the swath, exposed to the sun, which will exhale some part of its moisture, and deaden it enough for the purposes required, though it still retains the whole of its nutritious juices without abatement. After being allowed to lie thus long, it should be raked clean up, and carried off the field in the same cart that is employed for taking in the grafs, and immediately put into the stack, so as that the whole grafs that was cut that day, shall be put up before evening ; and thus regularly each good day throughout the season. But as grafs, while in this green and succulent state, would not keep if put up by itself, care must be taken to provide some dry forage to mix with it. For this purpose nothing can be so proper as good dry hay ; but for want of that, at the beginning, good straw may be very safely employed. The Doctor once saved a great quantity of clover hay, being a late third cutting, when the season was too far advanced to admit of its being made in the usual way, by putting it up when new cut, thus intermixed with a large proportion of good straw. It kept perfectly well ; and when cut down and given to the beasts, was relished by them better than any other hay he had, and was equally valuable for every purpose. Our author's method of *stacking* hay is noticed under that article.

The Doctor further observes, that for the purpose of *fat-tening* beasts, it may be necessary to mix the *hay* with the grafs ; but for rearing young beasts, or other purposes, it will be highly economical to make use of straw for this purpose : for straw of oats or barley, when thus mixed with grafs, will be equally good as ordinary hay. If economy were duly studied by farmers, says he, perhaps not one particle of these kinds of straw ought ever to be employed in any other way : nor could the possessor of *corn* farms ever be at a loss for making such an intermixture, as he will find it profitable always to have as much ground under clover, as would be sufficient thus to mix the whole of his straw, if he inclined. If the proportion of wheat straw be more than enough for litter, it may be cut and profitably applied in the same manner. The Doctor adds, that as much saving may arise from the proper distribution of buildings, and as this would become an object of much greater importance than it now is, were the system of stall-feeding in summer, as well as in winter, to become universal, a few words on that head may not be deemed superfluous or improper.

On the proper Construction of Farm Buildings.—Here our author remarks, that whatever diminishes the quantity of labour required of one man, produces a saving to the farmer that will be in proportion to that diminution of labour. In houses ill arranged, and of course inconvenient, it will require one man to feed and clean from ten to twenty stall-fed cattle ; but in houses properly constructed, he has known one man be able to feed and clean fifty head of beasts with great ease. The arrangement which admitted of this economy, was as under. The house was divided by a foot-way of six feet wide, running along the middle from end to end. On each side of it was a range of stalls for cattle, placed with their heads towards each other, of such a length as to admit of twenty-five to stand on a side, which at three feet for each will give seventy-five feet. At each end of this walk was a door, by one of

which the hay or other dry food was introduced; and at the other turnips or other food recently brought home were laid down, so as not to mix with or foul the hay. Along each side of the walk was placed a wooden trough running the whole length without interruption, a section of which was of this shape U, the bottom being about six inches wide. Between each beast there was a small division by means of a board, perforated below, and the whole trough was placed in an exact horizontal position, the bottom being raised about six inches from the ground. Behind the troughs were placed the stakes to which the beasts were fastened. The floor on which they stood was paved, sloping a little backwards; and at a length just sufficient to allow the beasts to stand easily and no more, it was lowered at once about three inches, so that the dung which was dropped from the beasts, when they stood right, fell into the lower division. This part of it, and indeed the whole, was made very smooth, so as to admit of the dung being easily swept off by a broad-mouthed flat shovel or rake occasionally, and put into a wheel-barrow as often as was necessary, and thus carried off. The upper part of the structure was supported by stout posts placed at proper distances, and a passage of three feet left clear behind the cattle. This house had been originally intended to be left open without walls; but as it was found to be too cold for winter-feeding, to which it was solely appropriated, the spaces between the pillars had been walled in. For a house to be used the whole year round, it would best answer the purposes of this climate to have these intervals closed in winter, by boards that join to each other quite close, which could be removed during the summer so as to keep the cattle quite cool at that season. At one end of the stalls, where the situation will admit of it, should be a pipe of water, which could, by means of a stop-cock, be let into the troughs at pleasure. In this way the whole troughs could be filled at pleasure with pure water; and when the beasts had drunk as much as they inclined, the water that remained could be let off by opening a plug in the bottom, and carried clear away by a channel prepared for that purpose. In feeding, the attendant fills a barrow properly constructed for that purpose, and wheels it along the middle walk, giving to each beast, as he goes along, a small quantity only of that kind of food; and so on till he goes over the whole. As soon as that is eaten up (or if any part of it remains in the stall of a particular beast, he takes it first away), he gives each beast in the same manner another small quantity of a different kind of food. In this way he goes over them three or four times successively, varying the food at each time if he can; and always reserving to the last the sweetest and most palatable kind of food by way of dessert. Then sweep their troughs clean; and if they have got much dry food, especially if salt has been administered, the trough ought to be filled with water, at least four times a-day; which will keep it always sweet and clean, and induce them to eat much more than they would have done without such attention.

Sheep may be Stall-fed.—Hitherto, says the Doctor, I have supposed that stall feeding can only be employed with regard to beasts that have been usually kept in the house, viz. cattle, horses, and swine: but it will be presumed, that sheep must be thrown out of the list of domestic animals, if ever the mode of stall-feeding, on green food above recommended, should come into general practice. So far is this, however, from being the case, that he is inclined to believe, that if sheep should be fed after this manner, the improvement will be greater on them than any other class of animals. It is true, says he, we have never yet been accustomed to see sheep fastened to a stake, and thus fed by hand, like what has been done with cattle: but this only proves that we have not hitherto considered the subject with the attention it requires, and no more; for he knows of no instance where it ever has been tried and proved abortive.

It behoves us then to enquire what reasons we have for believing that it would not succeed; and if we can find none which tend to that point, but rather the reverse, we ought at least to suspend our ultimate decision on that point, until the fact shall be clearly ascertained by fair experiment. We know, says the Doctor, that the sheep is an animal as gentle in its nature, and as susceptible of domestication and controul, as any creature whatever; and therefore we have no reason to believe that it would make any violent struggle, or such efforts as might tend to retard its thriving, if tied up; but much the reverse; for it delights in ease and quiet: so that in this state it would meet with an indulgence in this respect entirely suitable to its nature. And we further know, that no domestic animal suffers so much from wet as the sheep: for, on account of the thickness of its fleece, it becomes so weighty when wet, as to overload the poor creature so as to oppress it. And as it is long before it can be dried, especially in winter, the animal is chilled by the cold while thus drenched in wet, so as greatly to retard its thriving. But if the sheep were put into a stall *when dry*, and never suffered to go from under cover to be wetted, it must be totally freed from both of those inconveniencies; in consequence of which it could not fail, as one would think, says he, to thrive much better under this mode of management, than that to which it has hitherto been commonly subjected.

In answer to this, says he, it may perhaps be alleged that we do not observe that sheep thrive in general better in those districts, where they are usually put up under cover all night in cots, than in those districts where they are never housed at all, but rather the reverse. He believes indeed that they always thrive worse where they are cotted than where they are suffered always to lie without doors: but this, he says, seems not at all to militate against the practice recommended, because the cases differ from each other in an extreme degree. When put up into a cot, while the sheep are yet wet, as must often, indeed usually, be the case in winter, and there stowed very close together, as they usually are in these circumstances, they must soon become extremely hot, and a copious steam arise from their wet skins, under which they must be stewed for the greatest part of the night: but it is well known that the sheep delights rather in a cold than a hot climate; and if it be dry, this animal never seems to enjoy such perfect health as during the coldest weather we ever experience, provided it have at all times abundant food. This kind of stewing heat thus produced can scarcely fail to prove highly detrimental to the creature; and when it is considered that the vapour that rises from its own dung, on which, to a great depth, it is usually obliged to lie in these cots, mixes plentifully with the warm aqueous vapour, it can scarcely fail but that diseases of various sorts will be the consequence. Nor is this all: after being stewed all night in this close place, and put into a state of high perspiration, the poor creature is turned out hungry in the morning, perhaps amidst frost and snow, which soon freezes the water in its fleece, stops all the pores in the skin, suddenly checks all perspiration, and chills the poor creature almost to death during the whole day. Under this kind of management it would be wonderful indeed if diseases innumerable were not to be the consequence. But where the creature is put up while dry, and is kept continually so, and at rest ever afterwards in a cool airy place, where it never can be so much crowded as to suffer any extraordinary degree of variation in regard to heat or cold, and at the same time receives abundance of nourishing food, none of these evils can be experienced; and the diseases which originate from that source can never be expected to be seen. From these considerations there seems, he thinks, to be good grounds for believing that sheep will admit of being stall-fed, with perhaps greater benefit to the person who adopts that mode of management, than that which is to be drawn from any other animal.

whatever. Those then who would wish to fatten sheep under the system recommended, in preference to other kinds of domestic animals, have no reason to think that they will be under a necessity of laying aside the scythe on that account. It will be easy to contrive low apartments under the hay-ricks, properly divided by stakes and alleys of a proper size, bounded by stakes, as for cattle, of a proportional size, to which the sheep may be fastened, and thus to be regularly fed by hand throughout the season.

On the Consumption of Turnips by Sheep.—Turnips, says our author, are an article of such vast importance to the farmer, and the economical modes of consuming them have been so little adverted to, that I cannot omit offering a few short hints on that head. There are three modes in which turnips have been hitherto chiefly applied; viz. 1st, eating them by sheep on the field in which they grew; 2d, drawing them and giving them to cattle *in the house*; or, 3d, drawing them and giving them to beasts in the field. To these practices he does not object; but there are some circumstances respecting the management of each, that do not seem to him as yet to have obtained all the attention they deserve. In consuming turnips where they grew, by sheep, much waste is incurred over most parts in Britain, by letting them have access to too great a quantity at once. It is not uncommon to hurdle off as much ground at once, as is intended to keep the sheep for a week at least; and sometimes as much as will serve them four weeks without moving the hurdles. The sheep have thus at one time too much food; in consequence of which they range at once over the whole, and break during the first day almost every turnip in the field, all of which broken turnips begin instantly to rot; so that many of them become so putrid and stinking that no creature will taste them, and a large proportion of wholesome food is thus inevitably wasted. Nor is this the only waste sustained by this practice. As the pulp of the turnip is more palatable to the sheep than the rind, they naturally scoop out the pulp from the whole, before they ever think of eating any more of the rind than is necessary to give them access to the pulp. When that pulp is all consumed, however, they must either eat the rind *alone*, or the whole of it will be lost; so that the farmer finds himself constrained either to keep his sheep so long upon that part of the turnips, as to compel them through hunger to eat the turnip-peel (in which case the creature must cease to thrive, if not fall back into a worse condition than before), or he must resolve to abandon the turnip skins to waste also, although he knows that these, under proper management, are a very wholesome kind of food. A good economist will think it necessary to adopt such a mode of management, as to sustain no sort of waste in this case.

In this view, says the Doctor, he will not blindly adopt the notion which seems to be but too common, that turnips can only be beneficially employed for *fattening* of sheep; but he will examine with attention, whether under certain circumstances he might not be more benefited by *rearing* sheep by the aid of turnips than by *fattening* them. Every considerate man knows that the market for fatted sheep is extremely limited, in many remote situations, which are peculiarly adapted for sheep-rearing; but that if he can contrive to keep his breeding sheep always in high condition, he will find abundance of markets for these at good prices, where sheep in worse order could not be sold at all. When turnips were first introduced into the remote parts of Britain, they were invariably considered as being in a manner exclusively adapted for the fattening of beasts; and that was the use to which they were solely applied: but, by degrees, experience taught the farmers in some remote situations, that a much greater profit could be derived from applying them to the sustaining of milk cows, and the rearing of young cattle, than to the feeding of them; and these are the

uses to which this valuable article is now chiefly applied. But the use of turnips for keeping on a breeding stock of sheep, though it is known in some districts in Britain, is far less generally understood than it deserves to be. By this mode of applying turnips, however, it would seem to be a very easy matter for an attentive economist to avoid the waste above pointed out, and to derive the full benefit from all his turnips with much improvement to his flock.

What is therefore required for keeping a young flock in a constant state of growth through the whole year round, is, to prevent them from being ever stinted for food, especially of the tender and succulent sort. It must happen, however, that during the winter, when the days are short and the weather severe, very little succulent food of any kind can be found on their common pastures; so that they are pinched for hunger, and greatly decline during that season, if they do not die entirely. What is wanted then is a small addition to their ordinary food, administered so equally throughout the winter season, as to give them each day enough to prevent them from shivering, though not so much as to fatten them for the butcher. This will be best done by giving them a snap of turnips each night, that shall in quantity be just sufficient for this purpose, without being so much as to prevent them from seeking and relishing their ordinary food throughout the day. With this view, let us suppose that a row of hurdles is run along one side of a field of turnips, so far only as is just sufficient to allow the whole flock to get access to the turnips with their heads at one time. Let this row of hurdles be moved just so far back every day, as to leave access to as many turnips as shall be judged sufficient for this purpose, and no more. The consequence will be, that when the sheep come in from their pastures at night, after having picked up as much through the day as they could there find, they will eat their turnips by way of dessert; and then lie down to repose during the night in a comfortable state, with their bellies full. If the food throughout the day has been scanty, the turnips will be all eaten up at night, skins and all. If the food has been more abundant, perhaps a few of the skins may be left till the morning, when they will be clean eaten up. In general, it will be advisable to set off rather fewer turnips at one time than the sheep could easily eat up, in order that none may be wasted. By this practice the sheep will be kept in perfect health and high condition, throughout the whole year, and will grow, nearly, as much during the winter as the summer months. The ewes in particular will be kept strong and healthy, so as to produce stout lambs, and afford milk in much greater quantities when they yearn, than they otherwise would have done; as is known to be invariably the case with cows that have been kept up by means of turnips during the winter; and being in high health in the spring, the whole flock will advance with the first spurt of early grass, so as to be at all seasons more forward for market, and consequently bring much higher prices than otherwise could have been expected.

And by moving the hurdles regularly forward, as proposed, and leaving the field open behind them, the area in which the sheep are confined will become larger every day as the seasons advance, so as to give them better room to choose their bed where they find it most convenient. A necessary consequence of this will be, that if the field be uneven in its surface, the sheep will naturally choose to lie most upon the high and dry patches, which are usually the poorest parts of the field, so that these patches will thus get a more than ordinary share of the dung, which is precisely what they stand in need of to make the crop equal over the whole. To admit of this, it will be proper to begin in all cases at the higher parts of the field, and advance downward to the lowest extremity.

The Doctor also suggests that turnips might be advantageously employed for various other purposes, particularly for dairy

cows, which under a judicious management can be fed by them without affecting the taste of the milk in the smallest degree, and of course requiring no process for removing that taste; and for rearing young horses, to which use turnips can be applied with singular economy; as well as for various other uses, which the attentive economist will discover when his attention is steadily directed to the matter.

The Doctor concludes by observing, that it would give

him great pleasure, if he could indulge a hope, that in consequence of these hints the reader should be induced to think for himself in all cases; to reflect upon the objects he sees; to examine the foundation of popular opinions, and then to draw his own conclusions from the whole. It is thus he will acquire sound knowledge, says he, much better than by relying on the instructions he shall receive from any writer whatever.

H U S

Virgilian HUSBANDRY, a term used by authors to express that sort of husbandry, the precepts of which are so beautifully delivered in Virgil's Georgics. The husbandry in England is Virgilian in general, as is seen by the method of paring and burning the surface, of raftering or cross-ploughing, and of the care in destroying weeds, upon the same principle, and by much the same means. In those parts of England along the southern coast, where the Romans principally inhabited, not only the practice, but the expressions, are in many respects the same with those of the ancient Romans; many of the terms used by the ploughmen being of Latin origin, and the same with those used by those people on the like occasions. And on a strict observation, more of Virgil's husbandry is at this time practised in England than in Italy itself. This change in the Italian husbandry is, however, much more to the credit of that people, than the retaining the Virgilian scheme is to ours. Tull, who has established a new method of husbandry, observes, that it is upon the whole so contradictory to this old plan, that it may be called the *anti-Virgilian husbandry*; and adds, that no practice can be worse than the Virgilian.

HUSK, the same with what botanists call the *calyx* or *cup* of a flower. See CALYX.

HUSO, in ichthyology. See ACCIPENSER.

HUSS (John). See HUSSITES.

HUSSARS, are the national cavalry of Hungary and Croatia. Their regimentals consist in a rough furred cap, adorned with a cock's feather (the officers either an eagle's or a heron's); a doublet, with a pair of breeches to which the stockings are fastened, and yellow or red boots: besides, they occasionally wear a short upper waistcoat edged with furs, and five rows of round metal buttons; and in bad weather, a cloak. Their arms are a sabre, carbine, and pistols. They are irregular troops: hence, before beginning an attack, they lay themselves so flat on the necks of their horses, that it is hardly possible to discern their force; but being come within pistol-shot of the enemy, they raise themselves with such surprising quickness, and begin the fight with such vivacity on every side, that, unless the enemy is accustomed to their method of engaging, it is very difficult for troops to preserve their order. When a retreat is necessary, their horses have so much fire, and are so indefatigable, their equipage so light, and themselves such excellent horsemen, that no other cavalry can pretend to follow them. They leap over ditches, and swim over rivers, with surprising facility. They never encamp, and consequently are not burthened with any camp equipage, saving a kettle and a hatchet to every six men. They always lie in the woods, out-houses, or villages, in the front of the army. The emperor, and king of Prussia, have the greatest number of troops under this name in their service.

HUSSITES, in ecclesiastical history, a party of reformers, the followers of John Hus. This person, from whom the Hussites take their name, was born in a little village in Bohemia, called *Hufs*, and lived at Prague in the highest reputation, both on account of the sanctity of his manners and the purity of his doctrine. He

H U S

was distinguished by his uncommon erudition and eloquence, and performed at the same time the functions of professor of divinity in the university, and of ordinary pastor in the church of that city. He adopted the sentiments of Wickliffe, and the Waldenses; and in the year 1407 began openly to oppose and preach against divers errors in doctrine, as well as corruptions in point of discipline, then reigning in the church. Hus likewise endeavoured to the utmost of his power to withdraw the university of Prague from the jurisdiction of Gregory XII. whom the kingdom of Bohemia had hitherto acknowledged as the true and lawful head of the church. This occasioned a violent quarrel between the incensed archbishop of Prague and the zealous reformer; which the latter inflamed and augmented from day to day, by his pathetic exclamations against the court of Rome, and the corruptions that prevailed among the sacerdotal order.

There were other circumstances that contributed to inflame the resentment of the clergy against him. He adopted the philosophical opinions of the Realists, and vehemently opposed, and even persecuted the Nominalists, whose number and influence were considerable in the university of Prague. He also multiplied the number of his enemies in the year 1408, by procuring, through his great credit, a sentence in favour of the Bohemians, who disputed with the Germans concerning the number of suffrages which their respective nations were entitled to in all matters that were carried by election in this university. In consequence of a decree obtained in favour of the former, which restored them to their constitutional right of three suffrages, usurped by the latter, the Germans withdrew from Prague, and, in the year 1409, founded a new academy at Leipstick. This event no sooner happened, than Hus began to inveigh with greater freedom than he had before done against the vices and corruptions of the clergy, and to recommend, in a public manner, the writings and opinions of Wickliffe, as far as they related to the papal hierarchy, the despotism of the court of Rome, and the corruption of the clergy. Hence an accusation was brought against him, in the year 1410, before the tribunal of John XXIII. by whom he was solemnly expelled from the communion of the church. Notwithstanding this sentence of excommunication, he proceeded to expose the Romish church with a fortitude and zeal that were almost universally applauded.

This eminent man, whose piety was equally sincere and fervent, though his zeal was perhaps too violent, and his prudence not always circumspect, was summoned to appear before the council of Constance. Secured, as he apprehended, from the rage of his enemies by the safe-conduct granted him by the emperor Sigismund, for his journey to Constance, his residence in that place, and his return to his own country; John Hus obeyed the order of the council, and appeared before it to demonstrate his innocence, and to prove that the charge of his having deserted the church of Rome was entirely groundless. However, his enemies so far prevailed, that, by the most scandalous breach of public faith, he was cast into prison, declared

a heretic because he refused to plead guilty against the dictates of his conscience, in obedience to the council, and burnt alive in 1415; a punishment which he endured with unparalleled magnanimity and resignation. The same unhappy fate was borne by Jerome of Prague, his intimate companion, who attended the council in order to support his persecuted friend. Jerome, indeed, was terrified into temporary submission; but he afterwards resumed his fortitude, and maintained the opinions, which he had for a while deserted through fear, in the flames in which he expired in 1416.

The disciples of Hus adhered to their master's doctrine, after his death, with a zeal which broke out into an open war, that was carried on with the most savage and unparalleled barbarity. John Ziska, a Bohemian knight, in 1420, put himself at the head of the Hussites, who were now become a very considerable party, and threw off the despotic yoke of Sigismund, who had treated their brethren in the most barbarous manner. Ziska was succeeded by Procopius, in the year 1424. The acts of barbarity that were committed on both sides were shocking and horrible beyond expression: for notwithstanding the irreconcilable opposition between the religious sentiments of the contending parties, they both agreed in this one horrible principle, that it was innocent and lawful to persecute and extirpate with fire and sword the enemies of the true religion; and such they reciprocally appeared to each other. These commotions in a great measure subsided, by the interference of the council of Basil, in the year 1433.

The Hussites, who were divided into two parties, viz. the Calixtines and Taborites, spread over all Bohemia and Hungary, and even Silesia and Poland; and there are some remains of them still subsisting in all those parts.

HUSTINGS, from the Saxon word *Hustinge*, i. e. *concilium*, or *curia*, a court held in Guildhall before the lord-mayor and aldermen of London, and reckoned the supreme court of the city. Here deeds may be inrolled, outlawries sued out, and replevins and writs of error determined. In this court also is the election of aldermen, of the four members of parliament for the city, &c. This court is very ancient, as appears by the laws of Edward the Confessor. Some other cities have likewise had a court bearing the same name, as Winchester, York, &c.

HUSUM, a town of Denmark, in the duchy of Sleswick, and capital of a bailiwick of the same name, with a strong citadel, and a very handsome church. It is seated near the river Ow, on the German sea; and is subject to the dukes of Holstein-Gottorp. E. long. 9. 5. N. lat. 54. 55.

HUTCHESON (Dr. FRANCIS), a very elegant writer and excellent philosopher, was the son of a dissenting minister in the north of Ireland, and was born on the 8th of August 1694. He early discovered a superior capacity; and having gone through a school-education, began his course of philosophy at an academy, whence he removed to the university of Glasgow, where he applied himself to all the parts of literature, in which his progress was suitable to his uncommon abilities.

He then returned to Ireland; and entering into the ministry, was just about to be settled in a small congregation of dissenters in the north of Ireland, when some gentlemen about Dublin, who knew his great abilities and virtues, invited him to take up a private academy there. He complied with the invitation, and met with much success. He had been fixed but a short time in Dublin, when his singular merits and accomplishments made him generally known; and his acquaintance was sought by men of all ranks, who had any taste for literature, or any regard for learned men. The late lord viscount Molesworth is said to have taken great pleasure in his conversation, and to have assisted him with his criticisms and

observations upon his "Inquiry into the Ideas of Beauty and Virtue," before it came abroad. He received the same favour from Dr. Synge, lord bishop of Elphin, with whom he also lived in great friendship. The first edition of this performance came abroad without the author's name, but the merit of it would not suffer him to be long concealed. Such was the reputation of the work, and the ideas it had raised of the author, that lord Granville, who was then lord lieutenant of Ireland, sent his private secretary to enquire at the bookseller's for the author; and when he could not learn his name, he left a letter to be conveyed to him: in consequence of which he soon became acquainted with his excellency, and was treated by him, all the time he continued in his government, with distinguished marks of familiarity and esteem.

From this time his acquaintance began to be still more courted by men of distinction either for station or literature in Ireland. Archbishop King, the author of the celebrated book *De origine mali*, held him in great esteem; and the friendship of that prelate was of great use to him in screening him from two several attempts made to prosecute him, for daring to take upon him the education of youth, without having qualified himself by subscribing the ecclesiastical canons, and obtaining a licence from the bishop. He had also a large share in the esteem of the primate Bolter, who through his influence made a donation to the university of Glasgow of a yearly fund for an exhibitioner to be bred to any of the learned professions. A few years after his "Inquiry into the Ideas of Beauty and Virtue," his "Treatise on the Passions" was published: both these works have been often reprinted; and always admired, both for the sentiments and language, even by those who have not assented to the philosophy of them, nor allowed it to have any foundation in nature. About this time he wrote some philosophical papers, accounting for laughter, in a different way from Hobbes, and more honourable to human nature: which papers were published in the collection called *Hibernicus's Letters*.

After he had taught in a private academy at Dublin for seven or eight years with great reputation and success, he was called, in 1729, to Scotland, to be a professor of philosophy in the university of Glasgow. Several young gentlemen came along with him from the academy, and his high reputation drew many more thither both from England and Ireland. Here he spent the remainder of his life in a manner highly honourable to himself and ornamental to the university of which he was a member. His whole time was divided between his studies and the duties of his office; except what he allotted to friendship and society. A firm constitution and a pretty uniform state of good health, except some few slight attacks of the gout, seemed to promise a longer life; yet he did not exceed the 53d year of his age. He was married, soon after his settlement in Dublin, to Mrs. Mary Wilson, a gentleman's daughter in the county of Longford; by whom he left behind him one son, Francis Hutcheson, doctor of medicine. By this gentleman was published, from the original manuscript of his father, "A System of Moral Philosophy, in three books, by Francis Hutcheson, LL. D. at Glasgow, 1755," in two volumes 4to.

HUTCHINSON (JOHN), a philosophical writer, whose notions have made no inconsiderable noise in the world, was born in 1674. He served the duke of Somerset in the capacity of steward; and in the course of his travels from place to place employed himself in collecting fossils: we are told, that the large and noble collection bequeathed by Dr. Woodward to the university of Cambridge was actually made by him, and even unfairly obtained from him. When he left the duke's service to indulge his studies with more freedom, the duke, then master of the horse to George I. made him his riding surveyor, a kind of sinecure place of 200l. a year with a good house in the Meuse. In 1724 he published the first part of *Moses's*

Principia, in which he ridiculed Dr. Woodward's Natural History of the Earth, and exploded the doctrine of gravitation established in Newton's *Principia*: in 1727, he published the second part of *Moses's Principia*, containing the principles of the Scripture Philosophy. From this time to his death, he published a volume every year or two, which, with the MSS. he left behind, were published in 1748, in 12 vols. 8vo. On the Monday before his death, Dr. Mead urged him to be bled; saying pleasantly, "I will soon send you to Moses," meaning to his studies: but Mr. Hutchinson taking it in the literal sense, answered in a muttering tone, "I believe, Doctor, you will;" and was so displeased, that he dismissed him for another physician; but died in a few days after, August 28, 1737. Singular as his notions are, they are not without some defenders, who have obtained the appellation of *Hutchinsonians*. The reader may find a distinct and comprehensive account of the Hutchinsonian system in a book entitled, *Thoughts concerning Religion*, &c. printed at Edinburgh 1743; and in a letter to a bishop, annexed to it, first printed in 1732.

HUXING of pike, among fishermen, a particular method of catching that fish. For this purpose, they take 30 or 40 as large bladders as can be got; blow them up, and tie them close and strong; and at the mouth of each tie a line, longer or shorter according to the depth of the water. At the end of the line is fastened an armed hook, artfully baited; and thus they are put into the water with the advantage of the wind, that they may gently move up and down the pond. When a master pike has struck himself, it affords great entertainment to see him bounce about in the water with a bladder fastened to him: at last, when they perceive him almost spent, they take him up.

HUY, a town of the Netherlands, in the bishopric of Liege, and capital of Condras. It is advantageously seated on the river Maese, over which there is a bridge. E. long. 10. 22. N. lat. 52. 31.

HUYGENS (CHRISTIAN), one of the greatest mathematicians and astronomers of the 17th century, was the son of Constantine Huygens, lord of Zuylichem, who had served three successive princes of Orange in the quality of secretary; and was born at the Hague in 1629. He discovered from his infancy an extraordinary fondness for the mathematics; in a little time made a great progress in them; and perfected himself in those studies under the famous professor Schooten, at Leyden. In 1649 he went to Holstein and Denmark, in the retinue of Henry count of Nassau; and was extremely desirous of going to Sweden, in order to see Des Cartes; but the count's short stay in Denmark would not permit him. He travelled into France and England; was, in 1663, made a member of the royal society; and, upon his return into France, M. Colbert, being informed of his merit, settled a considerable pension upon him to engage him to fix at Paris; to which Mr. Huygens consented, and staid there from the year 1666 to 1681, where he was admitted a member of the academy of sciences. He loved a quiet and studious manner of life, and frequently retired into the country to avoid interruption, but did not contract that moroseness which is so frequently the effect of solitude and retirement. He was the first who discovered Saturn's ring, and a third satellite belonging to that planet, which had hitherto escaped the eyes of astronomers. He discovered the means of rendering clocks exact, by applying the pendulum, and rendering all its vibrations equal by the cycloid. He brought telescopes to perfection, made many other useful discoveries, and died at the Hague in 1695. He was the author of several excellent works. The principal of these are contained in two collections; the first of which was printed at Leyden in 1682, in quarto, under the title of *Opera varia*; and the second at Amsterdam in 1728, in two volumes quarto, entitled *Opera reliqua*.

HUYSUM, the name of several Dutch painters; the most celebrated of whom was John, whose subjects were flowers, fruit, and landscapes. According to Mr. Pilkington, this illustrious painter hath surpassed all who have ever painted in that style; and his works excite as much surprise by their finishing as they excite admiration by their truth. He was born at Amsterdam in 1682, and was a disciple of Justus van Huysum his father. He set out in his profession with a most commendable principle, not so much to paint for the acquisition of money as of fame; and therefore he did not aim at expedition, but at delicacy, and, if possible, to arrive at perfection in his art. Having attentively studied the pictures of Mignon, and all other artists of distinction who had painted in his own style, he tried which manner would soonest lead him to imitate the lightness and singular beauties of each flower, fruit, or plant, and then fixed on a manner peculiar to himself, which seems almost inimitable. His pictures are finished with inconceivable truth; for he painted every thing after nature; and was so singularly exact, as to watch even the hour of the day in which his model appeared in its greatest perfection. By the judicious he was accounted to paint with greater freedom than Mignon or Brueghel; with more tenderness and nature than Mario da Fiori, Michael Angelo di Campidoglio, or Segers; with more mellowness than De Heem: and greater force of colouring than Baptist. His reputation rose to such a height at last, that he fixed immoderate prices on his works; so that none but princes, or those of princely fortunes, could pretend to become purchasers. Six of his paintings were sold at a public sale in Holland for prices that were almost incredible. One of them, a flower piece, for fourteen hundred and fifty guilders; a fruit piece for a thousand and five guilders; and the smaller pictures for nine hundred. The vast sums which van Huysum received for his works, caused him to redouble his endeavours to excel: no person was admitted into his room while he was painting, not even his brothers; and his method of mixing the tints, and preserving the lustre of his colours, was an impenetrable secret, which he never would disclose. Yet this conduct is certainly not to his honour, but rather an argument of a low mind, fearful of being equalled or surpassed. From the same principle, he would never take any disciples, except one lady, named Haverman; and he grew envious and jealous even of her merit. By several domestic disquiets his temper became changed; he grew morose, fretful, and apt to withdraw himself from society. He had many enviers of his fame, which has ever been the severe lot of the most deserving in all professions; but he continued to work, and his reputation never diminished. It is universally agreed that he has excelled all who have painted fruit and flowers before him, by the confessed superiority of his touch, by the delicacy of his pencil, and by an amazing manner of finishing; nor does it appear probable that any future artist will become his competitor. The care which he took to purify his oils and prepare his colours, and the various experiments he made to discover the most lustrous and durable, are instances of extraordinary care and industry as well as capacity. From having observed some of his works that were perfectly finished, some only half finished, and others only begun, the principles by which he conducted himself may perhaps be discoverable. His cloths were prepared with the greatest care, and primed with white, with all possible purity, to prevent his colours from being obscured, as he laid them on very lightly. He glazed all other colours except the clear and transparent, not omitting even the white ones, till he found the exact tone of the colour; and over that he finished the forms, the lights, the shadows, and the reflections, which are all executed with precision and warmth, without dryness or negligence. The greatest truth, united with the greatest brilliancy, and a velvet softness on the surface of his

objects, are visible in every part of his compositions; and as to his touch, it looks like the pencil of nature. Whenever he represented flowers placed in vases, he always painted those vases after some elegant model, and the bas-relief is as exquisitely finished as any of the other parts. Through the whole he shows a delicate composition, a fine harmony, and a most happy effect of light and shadow. Those pictures which he painted on a clear ground are preferred to others of his hand, as having greater lustre, and as they demanded more care and exactness in the finishing; yet there are some on a darkish ground, in which appear rather more force and harmony. It is observed of him, that in the grouping of his flowers, he generally designed those which were brightest in the centre, and gradually decreased the force of his colour from the centre to the extremities. The birds-nests and their eggs, the feathers, insects, and drops of dew, are expressed with the utmost truth, so as even to deceive the spectator. And yet, after all this merited and just praise, it cannot but be confessed, that sometimes his fruits appear like wax or ivory, without that peculiar softness and wariness which is constantly observable in nature. Besides his merit as a flower-painter, he also painted landscapes with great applause. They are well composed; and although he had never seen Rome, he adorned his scenes with the noble remains of ancient magnificence which are in that city. His pictures in that style are well coloured, and every tree is distinguished by a touch that is proper for the leafing. The grounds are well broken, and disposed with taste and judgment; the figures are designed in the manner of Leirisse, highly finished, and touched with a great deal of spirit; and through the whole composition, the scene represents Italy, in the trees, the clouds, and the skies. He died in 1749, aged 67.

HUZZOOR, a Hindoostan word signifying *The presence*; applied, by way of eminence, to the Mogul's court. According to polite usage, it is now applied to the presence of every Nabob or great man. The appellation *Huzzoor Neves* denotes the secretary who resides at court, and keeps copies of all *firmans*, records or letters.

HYACINTH, in natural history, a genus of pellucid gems, whose colour is red with a mixture of yellow. The hyacinth, though less striking to the eye than any other red gem, is not without its beauty in the finest specimens. It is found of various sizes, from that of a pin's head to the third of an inch in diameter. They are harder than quartz-crystals; transparent, and formed into prisms pointed at both ends. These points are always regular with regard to the number of facets; being four on each facet, but with some exceptions: the sides of the main body are also very uncertain, in regard both to their number and shape: being found of four, five, six, seven, and sometimes of eight sides; sometimes being so compressed as almost to resemble the face of a spherical faceted garnet. Sometimes they are of a dodecaedral form like the garnet, but with more obtuse angles. The specific gravity of the hyacinth, according to Dutens, is 2.631; but Romé de l'Isle says that Brisson found it to be 3.6473; and the European hyacinths to be 3.760.

The hyacinth, as well as all other gems, is divided into oriental and occidental; the former being very hard and brilliant, so that they are frequently ranked among the topazes; but when soft, they are supposed to belong to the garnet kind, as mentioned under that article. The hyacinths, however, may generally be distinguished from the garnets by losing their colour in the fire, becoming white, and not melting. There is a kind of a yellow-brown hyacinth, resembling the colour of honey, which is distinguished from the rest by the remarkable property of not being electrical, and being likewise inferior in hardness.

Our jewellers allow all those gems to be hyacinths or jacinths that are of a due hardness with the mixed colour above men-

tioned; and as they are of very different beauty and value in their several degrees and mixture of colours, they divide them into four kinds; three of which they call *hyacinths*, but the fourth, very improperly, a *ruby*. 1. When the stone is in its most perfect state, and of a pure and bright flame-colour, neither the red nor the yellow prevailing, in this state they call it *hyacintha la bella*. 2. When it has an over-proportion of the red, and that of a darker colour than the fine high red in the former, and the yellow that appears in a faint degree in it is not a fine, bright, and clear, but a dusky brownish yellow, then they call it the *saffron hyacinth*. 3. Such stones as are of a dead whitish yellow, with a very small proportion of red in them, they call *amber hyacinths*. And, 4. When the stone is of a fine deep red, blended with a dusky and very deep yellow, they call it a *rubacelle*. But though the over-proportion of a strong red in this gem has made people refer it to the class of rubies, its evident mixture of yellow shows that it truly belongs to the hyacinth.

The hyacinth *la bella* is found both in the East and West Indies. The oriental is the harder, but the American is often equal to it in colour. The rubacelle is found only in the East Indies, and is generally brought over among the rubies; but it is of little value: the other varieties are found in Silesia and Bohemia.

HYACINTHIA, in antiquity, feasts held at Sparta, in honour of Apollo, and in commemoration of his favourite Hyacinth. This Hyacinth was the son of Amyclas king of Sparta, and was beloved both by Apollo and Zephyrus. The youth showing most inclination to the former, his rival grew jealous; and, to be revenged, one day as Apollo was playing at the discus, i. e. quoits, with Hyacinth, Zephyrus turned the direction of a quoit which Apollo had pitched, full upon the head of the unhappy Hyacinth, who fell down dead. Apollo then transformed him into a flower of the same name; and as a farther token of respect, they say, commanded this feast. The Hyacinthia lasted three days; the first and third whereof were employed in bewailing the death of Hyacinth, and the second in feasting and rejoicing.

HYACINTHUS, HYACINTH, in botany; a genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 10th order, *Coronariæ*. The corolla is campanulated, and there are three melliferous pores at the top of the germen. There are six species; of which the most remarkable is the *orientalis*, or eastern hyacinth. Of this there are a great number of varieties, amounting to some hundreds, each of which differs from the rest in some respect or other. This plant hath a large, purplish, bulbous root, sending up several narrow erect leaves eight or ten inches long; the flower stalk is upright, robust, and succulent, from 10 to 15 inches in height; adorned upward with many large funnel or bell shaped flowers, swelling at the base, and cut half-way into six parts; collected into a large pyramidal spike of different colours in the varieties; flowering in April or May.

These plants are cultivated with the greatest success in Holland, from whence great numbers are annually imported into Britain. Each variety is by the florists distinguished either by the name of the place where first raised, or the person who raised them, or the names of illustrious personages, as of kings, generals, poets, and celebrated ancient historians, gods, goddesses, &c. They are sold by all the seed dealers. The prices are from three pence per root to five or ten pounds or more; and some varieties are in such high esteem among the florists, that 20*l.* or 30*l.* will be given for a single bulb. They are hardy, and will prosper any where, though the fine kinds require a little shelter during the winter. They may be propagated either by seeds or off-sets from the roots.

The properties of a good oriental hyacinth are, a stem perfectly upright, of moderate length, and so strong and well-proportioned that it will sustain the weight of the florets without bending: the florets should be large, swelling below, expanded above, and numerous, 10 or 15 at least, but are often 20 or 30 in number; and should be placed equally round the stem, the pedicles on which they grow longer below than above, diminishing gradually in length upward in such a manner as to represent a pyramid, and each pedicle sufficiently strong to support the florets without drooping. The curious in these plants are careful never to plant the fine sorts two years together in the same bed of earth; for, by planting them every year in a fresh bed, the beauty of the flowers is greatly improved.

HYADES, in astronomy, are seven stars in the bull's head, famous among the poets for the bringing of rain. Whence their name *Ἰαδης*, from the Greek *εἶναι* "to rain." The principal of them is in the left eye, by the Arabs called *aldebaran*. The poets feign them the daughters of Atlas and Pleone. Their brother Hyas being torn to pieces by a lioness, they wept his death with such vehemence, that the gods, in compassion to them, translated them into heaven, and placed them in the bull's forehead, where they continue to weep; this constellation being supposed to presage rain. Others represent the Hyades as Bacchus's nurses; and the same with the Dodonides, who fearing the resentment of Juno, and flying from the cruelty of king Lycurgus, were translated by Jupiter into heaven.

HYÆNA, in zoology, see CANIS.

HYÆNIUS LAPIS, in natural history, the name of a stone said to be found in the eyes of the hyæna. Pliny tells us, that those creatures were in old times hunted and destroyed for the sake of these stones, and that it was supposed they gave a man the gift of prophecy by being put under his tongue.

HYBERNACULUM, in botany, WINTER-QUARTERS; defined by Linnaeus to be part of the plant which defends the embryo herb from injuries during the severities of the winter. See BULB and GEMMA.

HYBLA, in ancient geography, or MEGARA; which last name it took from the Megareans, who led thither a colony; called also *Hybla Parva* and *Galeotis*. In Strabo's time Megara was extinct, but the name *Hybla* remained on account of its excellent honey named from it. It was situated on the east coast of Sicily, between Syracuse and the Leontines. *Galeotæ*, and *Megarenses*, the names of the people, who were of a prophetic spirit, being the descendants of Galeus the son of Apollo. *Hyblæus* the epithet.—The *Hyllæi colles*, small eminences at the springs of the Alabus near this place, were famous for their variety of flowers, especially thyme; the honey gathered from which was by the ancients reckoned the best in the world, excepting that of Hymettus in Attica. By the moderns it was called *Mel Passi*, for the same reason, namely, on account of its excellent honey, and extraordinary fertility, till it was overwhelmed by the lava of Ætna; and having then become totally barren, its name was changed to *Mal Passi*. In a second eruption, by a shower of ashes from the mountain, it soon reassumed its ancient beauty and fertility, and for many years was called *Bel Passi*: and last of all, in the year 1669, it was again laid under an ocean of fire, and reduced to the most wretched sterility; since which time it is again known by the appellation of *Mal Passi*. However, the lava in its course over this beautiful country has left several little islands or hillocks, just sufficient to show what it formerly was. These make a singular appearance in all the bloom of the most luxuriant vegetation, surrounded and rendered almost inaccessible by large fields of black and rugged lava.

HYBLA-Major, was situated in the tract lying between mount Ætna and the river Symethus. In Pausanias's time de-

solate. HYBLA-Minor, or *Heræa*, was an inland town of Sicily, situated between the rivers Oanus and Herminius; now RAGUSA.

HYBRIDA PLANTA, a monstrous production of two different species of plants, analogous to a mule among animals. The seeds of hybrid plants will not propagate.

HYBRISTICA, of *ἵβρις* injury, in antiquity, a solemn feast held among the Greeks, with sacrifices and other ceremonies; at which the men attended in the apparel of women, and the women in that of men, to do honour to Venus in quality either of a god or a goddess, or both. Or, according to the account given by others, the hybristica was a feast celebrated at Argos, wherein the women, being dressed like men, insulted their husbands, and treated them with all marks of superiority, in memory of the Argian dames having anciently defended their country with singular courage against Cleomenes and Demaratus. Plutarch speaks of this feast in his treatise of the great actions of women. The name, he observes, signifies, infamy; which is well accommodated to the occasion, wherein the women strutted about in men's clothes, while the men were obliged to dangle in petticoats.

HYDATIDES, in medicine, little transparent vesicles or bladders full of water, sometimes found solitary and floating about, and sometimes in clusters, upon the liver and various other parts, especially in hydropical cases. Each is a distinct animal possessing life. Hydatids are frequently met with in quadrupeds; especially in the brain in sheep.

HYDATOSCOPIA, called also HYDROMANCY, a kind of divination or method of foretelling future events by water.

HYDE (EDWARD), earl of Clarendon, and lord high chancellor of England, was descended from an ancient family in Cheshire, and born at Dinton near Hindon, in Wiltshire, in 1608. He was entered of Magdalen-hall, Oxford, where, in 1625, he took the degree of A. B. and afterwards studied the law in the Middle Temple. In the parliament which began at Westminster April 10, 1640, he served for Wotton-Ballet in Wiltshire. But that parliament being soon after dissolved, he was chosen for Saltash in Cornwall in the long parliament. His abilities were much taken notice of, and he was employed in several committees to examine into divers grievances; but at last being dissatisfied with the proceedings in the parliament, he retired to the king, and was made chancellor of the exchequer, a privy-counsellor, and knight. Upon the declining of the king's cause, he went to France, where, after the death of Charles I. he was sworn of the privy-council to Charles II. In 1649, he and the lord Cottington were sent ambassadors extraordinary into Spain, and in 1657 he was constituted lord high chancellor of England. The year before the restoration, the duke of York fell in love with Mrs. Anne Hyde, the lord chancellor's eldest daughter, but carefully concealed the amour both from the king and chancellor. As it was by a promise of marriage, however, that he had gained upon her, he was afterwards induced to fulfil his engagement, and the ceremony was performed after the restoration. Upon the restoration, her father was chosen chancellor of the university of Oxford; and soon after created baron Hindon, in Wiltshire, viscount Cornbury in Oxfordshire, and earl of Clarendon in Wiltshire; and on the death of Henry lord Falkland, was made lord lieutenant of Oxfordshire. He took care neither to load the king's prerogative, nor encroach upon the liberties of the people; and therefore would not set aside the petition of right, nor endeavour to raise the star-chamber or high-commission courts again: nor did he attempt to repeal the bill for triennial parliaments; and when he might have obtained two millions for a standing revenue, he asked but one million two hundred thousand pounds per annum, which he thought would still put the king upon the necessity of having recourse to his parliament. In this just conduct he

is said to have been influenced by the following incident, which happened some years before. When he first began to grow eminent in the law, he went down to visit his father in Wiltshire; who, one day as they were walking in the fields together, observed to him, that men of his profession were apt to stretch the prerogative too far, and to injure liberty; but charged him, if ever he came to any eminence in his profession, never to sacrifice the laws and liberty of his country to his own interest or the will of his prince: he repeated his advice twice; and immediately falling into a fit of an apoplexy, died in a few hours: and this circumstance had a lasting influence upon him. In 1662, he opposed a proposal for the king's marriage with the infanta of Portugal, and the sale of Dunkirk: however, the following year, articles of high treason were exhibited against him by the earl of Bristol; but they were rejected by the house of lords. In 1664, he opposed the war with Holland. In August 1667, he was removed from his post of lord-chancellor; and in November following impeached of high treason and other crimes and misdemeanors by the house of commons: upon which he retired into France, when a bill was passed for banishing him from the king's dominions. He resided at Rouen in Normandy: and dying there in 1674, his body was brought to England and interred in Westminster-abbey. He wrote, 1. A history of the rebellion, 3 vols. folio, and 6 vols. octavo; a second part of which was afterwards given to the public by his lordship's descendant the late lord Hyde and Cornbury. 2. A letter to the duke of York, and another to the dukes of York, upon occasion of their embracing the Romish religion. 3. An answer to Hobbes's Leviathan. 4. A history of the rebellion and civil wars in Ireland, octavo; and some other works.

The following character of this nobleman is given by Mr. Walpole: "Sir Edward Hyde (says he), who opposed an arbitrary court, and embraced the party of an afflicted one, must be allowed to have acted conscientiously. A better proof was his behaviour on the restoration, when the torrent of an insatuated nation entreated the king and his minister to be absolute. Had Clarendon sought nothing but power, his power had never ceased. A corrupted court and a blinded populace were less the causes of the chancellor's fall, than an ungrateful king, who could not pardon his lordship's having refused to accept for him the slavery of his country. Like justice herself, he held the balance between the necessary power of the supreme magistrate and the interests of the people. This never-dying obligation his contemporaries were taught to overlook and clamour against, till they removed the only man, who, if he could, would have corrected his master's evil government. Almost every virtue of a minister made his character venerable. As an historian, he seems more exceptionable. His majesty and eloquence, his power of painting characters, his knowledge of his subject, rank him in the first class of writers; yet he has both great and little faults. Of the latter, his stories of ghosts and omens are not to be defended. His capital fault is his whole work being a laboured justification of king Charles. If he relates faults, some palliating epithet always slides in; and he has the art of breaking his darkest shades with gleams of light that take off all impression of horror. One may pronounce on my lord Clarendon, in his double capacity of statesman and historian, that he acted for liberty, but wrote for prerogative."

HYDE (Dr. Thomas), professor of Arabic at Oxford, and one of the most learned writers of the 17th century, was born in 1636; and studied first at Cambridge, and afterwards at Oxford. Before he was 18 years of age, he was sent from Cambridge to London to assist Mr. Brian Walton in the great work of the Polyglot Bible; and about that period undertook to transcribe the Persian Pentateuch out of the Hebrew character.

which archbishop Usher, who well knew the difficulty of the undertaking, pronounced to be an impossible task to a native Persian. After he had happily succeeded in this, he assisted in correcting several parts of Mr. Walton's work, for which he was perfectly qualified. He was made archdeacon of Gloucester, canon of Christ-church, head keeper of the Bodleian library, and professor both of Hebrew and Arabic, in the university of Oxford. He was interpreter and secretary of the Oriental languages, during the reigns of Charles II. James II. and William III.; and was perfectly qualified to fill this post, as he could converse in the languages which he understood. There never was an Englishman in his situation of life who made so great a progress; but his mind was so engrossed by his beloved studies, that he is said to have been but ill qualified to appear to any advantage in common conversation. Of all his learned works (the very catalogue of which, as observed by Anth. Wood, is a curiosity), his *Religio Veterum Persarum* is the most celebrated. Dr. Gregory Sharpe, the late learned and ingenious master of the Temple, has collected several of his pieces formerly printed, and republished them, with some additional dissertations, and his life prefixed, in two elegant volumes quarto. This great man died on the 18th of February, 1702. Among his other works are, 1. A Latin translation of Ulug Beig's observations on the longitude and latitude of the fixed stars; and 2. A catalogue of the printed books in the Bodleian library.

HYDNUM, in botany; a genus of the natural order of fungi, belonging to the cryptogamia class of plants. The fungus is echinated or prickly on the under side. One of the species, named the *imbricatum*, is a native of Britain, and is found in woods. It hath a convex hat, tiled, standing on a smooth pillar, of a pale flesh-colour, with white prickles. It is eaten in Italy, and is said to be of a very delicate taste.

HYDRA, in fabulous history, a serpent in the marsh of Lerna, in Peloponnesus, represented by the poets with many heads, one of which being cut off, another immediately succeeded in its place, unless the wound was instantly cauterized. Hercules attacked this monster; and having caused Iolaus to hew down wood for flaming brands, as he cut off the heads he applied the brands to the wounds, by which means he destroyed the Hydra. This hydra with many heads is said to have been only a multitude of serpents, which infested the marshes of Lerna near Mycene, and which seemed to multiply as they were destroyed. Hercules, with the assistance of his companions, cleared the country of them, by burning the reeds in which they lodged.

HYDRA, in astronomy, a southern constellation, consisting of a number of stars, imagined to represent a water serpent. The stars in Hydra, in Ptolemy's catalogue, are twenty-seven; in Tycho's, nineteen; in Hevelius's, thirty-one.

HYDRA, in zoology; a genus of the order of zoophyta, belonging to the class of vermes. There are several species, known by the general name of polypes. See POLYPE and ANIMALCULE.

HYDRAGOGUES, among physicians, remedies which evacuate a large quantity of water in dropsies. The word is formed of *ὕδωρ* water, and *αγωγέω* to draw or lead; but the application of the term proceeds upon a mistaken supposition, that every purgative had some particular humour which it would evacuate, and which could not be evacuated by any other. It is now, however, discovered, that all strong purgatives will prove *hydragogues*, if given in large quantity, or in weak constitutions. The principal medicines recommended as hydragogues, are the juice of elder, the root of iris, soldanella, mechoacan, jalap, &c.

HYDRANGEA, in botany; a genus of the digynia order, belonging to the decandria class of plants; and in the natural

method ranking under the 13th order, *Succulentæ*. The capsule is bilocular, birostrated, and cut round, or parting horizontally. There is but one species, viz. the arboreseens, a native of North America, from whence it hath lately been brought to Europe, and is preserved in gardens, more for the sake of variety than beauty. It rises about three feet high; and hath many soft pithy stalks, garnished with two oblong heart-shaped leaves placed opposite. The flowers are produced at the top of the stalks in a corymbus. They are white, composed of five petals with ten stamina surrounding the style. It is easily propagated by parting the roots; the best time for which is the end of October. The plants thrive best in a moist soil, and require to be sheltered from severe frosts.

HYDRASTIS, in botany; a genus of the polygamia order, belonging to the polyandria class of plants; and in the natural method ranking with those of which the order is doubtful. There is neither calyx nor nectarium; there are three petals; and the berry is composed of monospermous acini.

HYDRARGYRUS, a name given to quicksilver. The word is formed of *ὕδωρ aqua*, "water," and *ἀργυρος argentum*, "silver;" q. d. *water of silver*, on account of its resembling liquid or melted silver.

HYDRAULICS, the science of the motion of fluids, and the construction of all kinds of instruments and machines relating thereto. See **HYDROSTATICS**, Part II.

HYDRENTEROCELE, in surgery, a species of hernia, wherein the intestines descend into the scrotum, together with a quantity of water.

HYDROCELE, in surgery, denotes any hernia arising from water; but is particularly used for such a one of the scrotum, which sometimes grows to the size of one's head, without pain, but exceedingly troublesome to the patient. See **SURGERY**.

HYDROCEPHALUS, a preternatural distension of the head to an uncommon size by a stagnation and extravasation of the lymph; which, when collected in the inside of the cranium, is then termed *internal*; as that collected on the outside has been termed *external*. See **MEDICINE**.

HYDROCHARIS, the **LITTLE WATER-LILY**; a genus of the enneandria order, belonging to the diœcia class of plants; and in the natural method ranking under the first order, *Palmeæ*. The spathe of the male is diphyllous; the calyx trifid; the corolla tripetalous; the three interior filaments styliferous. The female calyx trifid; the corolla tripetalous; the styles six; the capsule has six cells, and is polyspermous inferior. There is only one species, a native of Britain, growing in slow streams and wet ditches. It hath kidney-shaped leaves, thick, smooth, and of a brownish green colour, with white blossoms. There is a variety with double flowers of a very sweet smell.

HYDROCOTYLE, **WATER-NAVELWORT**; a genus of the digynia order, belonging to the pentandria class of plants, and in the natural method ranking under the 45th order, *Umbellatæ*. The umbel is simple; the involucre tetraphyllous; the petals entire; the seeds are half round and compressed. There are several species, none of which are ever cultivated in gardens. One of them, a native of Britain, growing in marshy grounds, is supposed by the farmers to occasion the rot in sheep. The leaves have central leaf-stalks, with about five flowers in a run-dle; the petals are of a reddish white.

HYDROGRAPHY, the art of measuring and describing the sea, rivers, canals, lakes, &c. With regard to the sea, it gives an account of its tides, counter-tides, soundings, bays, gulphs, creeks, &c.; as also of the rocks, shelves, sands, shallows, promontories, harbours; the distance and bearing of one port from another; with every thing that is remarkable, whether out at sea or on the coast.

HYDROLEA, in botany; a genus of the digynia order, belonging to the pentandria class of plants; and in the natural

method ranking with those of which the order is doubtful. The calyx is pentaphyllous; the corolla rotaceous; the filaments at the base are cordate; the capsule is bilocular and bilvalved.

HYDROMANCY, a method of divination by water, practised by the ancients. See **DIVINATION**.

HYDROMEL, honey diluted in nearly an equal weight of water. When this liquor has not fermented, it is called *simple hydromel*; and when it has undergone the spirituous fermentation, it is called the *vinous hydromel* or *mead*.

Honey, like all other saccharine substances, is susceptible of the spirituous fermentation. To induce this, nothing is necessary but to dilute it sufficiently in water, and to leave the liquor exposed to a convenient degree of heat. To make good mead, the best tasted honey must be chosen; and this must be put into a kettle with more than its weight of water: a part of this liquor must be evaporated by boiling, and the liquor scummed, till its consistence is such that a fresh egg shall be supported upon its surface without sinking more than half its thickness into the liquor; then the liquor is to be poured into a barrel, and exposed to a heat as equable as is possible, from 20 to 27 or 28 degrees of Reaumur's thermometer, taking care that the bung-hole be covered, but not closed. The spirituous fermentation will appear in this liquor, and will subsist during two or three months, according to the degree of heat; after which they will diminish and cease. During this fermentation, the barrel must be filled up occasionally with more of the same kind of liquor of honey, some of which ought to be kept apart on purpose to replace the liquor which flows out of the barrel in froth. When the fermentation ceases, and the liquor has become very vinous, the barrel is then to be put in a cellar and well closed. A year afterwards the mead will be fit to be put into bottles.

Mead is an agreeable kind of wine: nevertheless it retains long a taste of honey, which is displeasing to some persons; but this taste it is said to lose entirely by being kept a very long time. The spirituous fermentation of honey, as also that of sugar, and of the most of vinous liquors, when it is very saccharine, is generally more difficultly effected, requires more heat, and continues longer than that of ordinary wines made from the juice of grapes; and these vinous liquors always preserve a saccharine taste, which shows that a part only of them is become spirituous.

HYDROMETER, an instrument to measure the gravity, density, velocity, force, &c. of water and other fluids. See p. 12, and **HYDROSTATICS**.

Though this instrument is incapable of determining the specific gravity of liquors with perfect accuracy, yet in the way of public business it has undoubtedly the advantage of every other, on account of the ease and expedition with which it can be used; and for this reason it has been adopted by government, in order to determine the strength of spirituous liquors. Dr. Blagden (*Phil. Transf.* vol. 80. p. 342.), who was lately employed to make experiments on this subject, is of opinion, that glass is the most proper material for the construction of an hydrometer. Its sensibility depends on the size of its stem. In the old areometers the stem was made so large, that the volume of water displaced between its least and greatest immersions was equal to the whole difference of specific gravity between water and alcohol, or perhaps more; whence its scale of divisions must be very small, and could not give the specific gravity with much accuracy. On this account weights were introduced, by means of which the stem could be made smaller; each weight affording a new commencement of its scale; so that the size of the divisions on a given length was doubled, tripled, &c. as one or more weights were employed, the diameter of the stem being lessened in the subduplicate propor-

tion of the increased length of the divisions. This method, however, in our author's opinion, has been carried to excess; and the following is recommended as a proper mean betwixt these extremes, to determine the specific gravity of spirituous liquors to three places of decimals.

In this method the weight of water is supposed to be unity, or 1 with any number of cyphers annexed: "the whole compass of numbers, therefore, from rectified spirit to water, at 60 degrees of heat, would be the difference between 825 the weight of rectified spirit, and 1000 the weight of water, which is 175. To make allowance for the lightest spirit and heaviest water, however, at all the common temperatures, the difference may be supposed 220. The stem might show every twenty of these divisions, and thus ten weights would be sufficient for the whole. Hence the inconvenience of shifting the weights, which has always been complained of, would in a great measure be avoided; as people versant in that business would seldom err so far as to the whole amount of the difference previous to making any trial. Hence also the stem may be made small enough, and the scale graduated so nicely as to make the instrument sufficiently accurate.

According to this arrangement, it would be proper to have the weights adapted to the hydrometer marked with the different specific gravities which they are intended to indicate; zero on the top of the stem without a weight being supposed to mean 800, and 20 at the bottom to signify 820, which number the first weight would carry; the successive weights being marked, 840, 860, &c.; and the division on the stem cut by the fluid under trial, would be a number always to be added to that on the weight; the sum of the two showing the true specific gravity. The weights should undoubtedly be made to apply on the top of the stem, so as never to come in contact with the liquor; and in using the hydrometer, its stem should always be pressed down lower than the point at which it will ultimately rest, that by being wetted it may occasion no resistance to the fluid. The instrument itself should be of as regular a shape and with as few inequalities as possible, that all impediments to its motions may be avoided.

HYDROMPHALUS, in surgery; a name given to any tumor in the navel, that contains water.

HYDROPHANES, **OCULUS MUNDI**, or *Lapis Mutabilis*, a kind of precious stone highly esteemed among the ancients, but little known to the moderns till M. Boyle made his observations upon it. Its specific gravity is about 2.048; its colour of an opaque whitish brown; it is not soluble in acids nor affected by alkalis, but is easily cut and polished. Sometimes it gives fire with steel, sometimes not. It is infusible *per se*; but when urged by a blow pipe, changes to a brownish brittle substance. It is found in beds over the opals in Hungary, Silesia, and Saxony, and over the chalcedonies and agates in Iceland. These stones in general are either of a yellowish green, milky grey, or of a yellow like that of amber.

The most remarkable property of this stone is, that it becomes transparent by mere infusion in any aqueous fluid; but gradually resumes its opacity when dry. There are three of these stones in the British museum at London; the largest of them about the size of a cherry stone, but of an oval form. It is opaque and coloured like a common yellow pea; it may be scratched, though not without difficulty, by a common knife, notwithstanding which it seems to leave a mark upon glass. It does not ferment with nitrous acid. When it has lain some hours in water, it becomes transparent, and of a yellow amber colour. The change begins soon after the immersion, and at one end in form of a little spot; but in a small one of the same kind, the transparency begins round the edges. By degrees the spot increases, until the whole stone becomes uniformly clear throughout: when out of the water it loses its transpa-

rency, first at one end, and then gradually over the remainder, until the whole has become opaque; which change happens in less time than it takes to become transparent. This change is not entirely peculiar to the hydrophanes. Bergman informs us, that some steatites produce the same effect; and M. Magellan, that the crust of chalcedonies and agates frequently exhibits the same appearance.

Messrs. Bruckman and Veltheim were the first who particularly enquired into the nature of this stone, and investigated its properties, many of which were brought to light by their endeavours. Their account is to the following purport: As soon as the stone is put into water, it exhales a musty smell, several air-bubbles arise, and it becomes gradually transparent. Some of the stones become colourless as soon as they are thoroughly transparent, others have a more or less deep yellow colour; some acquire a beautiful ruby colour; and, lastly, others gain a fine colour of mother-of-pearl, or of a blueish opal. Whatever be the colour of the liquor in which the hydrophanes is immersed, it gains only its usual degree of transparency with the colour peculiar to it. When we look at it in its moist state, we perceive a luminous point, varying its situation as the position of the eye is altered. This luminous point is not, according to Mr. Bruckman, the immediate image of the sun, but a reflection of that image refracted in the substance of the stone itself, a phenomenon which probably gave rise to the name of *oculus mundi*. Mr. Bruckman left a piece of this stone weighing 35 grains seven hours in water, the space requisite to make it perfectly transparent; and in that time he found that it had gained three grains in weight. The hydrophanes becomes much sooner transparent when put into hot water; and the same happens if it be dipped in a very dilute acid, or rather a very dilute solution of alkali. When dipped in oil of vitriol, it becomes very quickly transparent, and will continue so, on account of the strong attraction of that acid for moisture, which takes as much from the atmosphere as is necessary to keep the stone transparent; but its opacity will return if it be dipped in an alkaline liquor and afterwards dried.

HYDROPHOBIA, an aversion or dread of water: a terrible symptom of the *rabies canina*; and which has likewise been found to obtain in violent inflammations of the stomach and in hysteric fits. See **MEDICINE**.

HYDROPHYLACIA, a word used by Kircher and some others who have written in the same system, to express those great reservoirs of water which he places in the Alps and other mountains for the supply of rivers which run through the several lower countries. This he makes to be one of the great uses of mountains in the economy of the universe.

HYDROPHYLLAX, in botany; a genus of the monogynia order, belonging to the tetrandria class of plants. The calyx is tetrapartite; the corolla funnel-shaped; the fruit two-edged and one-seeded.

HYDROPHYLLUM, **WATER LEAF**; a genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is campanulate, with five melliferous longitudinal stria on the inside; the stigma is bifid; the capsula globose and bivalved. There is only one species, *viz.* the *Virginianum*, or water-leaf of Morinus. It grows naturally in Canada and many other parts of America on moist spongy ground. The root is composed of many strong fleshy fibres, from which arise many leaves with footstalks five or six inches long, jagged into three, five, or seven lobes, almost to the midrib, indented on their edges. The flowers are produced in loose clusters hanging downward, are bell-shaped, and of a dirty white colour. It may be propagated by parting the roots; which ought to be done in autumn, that the plants may be well rooted before spring, otherwise they will require a great deal of water.

HYDROPS, in medicine, the same with DROPSY.

HYDROSCOPE, an instrument anciently used for the measuring of time. The hydroscope was a kind of water-clock, consisting of a cylindrical tube, conical at bottom: the cylinder

was graduated, or marked out with divisions, to which the top of the water becoming successively contiguous, as it trickled out at the vertex of the cone, pointed out the hour.

HYDROSTATICS;

THE science which treats of the nature, gravity, pressure, and equilibrium of fluids, and of the weighing of solids in them: that part of the science of fluids which treats of their

motions being included under the head of *Hydraulics*. In conformity with what is customary in books of philosophy, we shall treat these subjects in two distinct parts.

PART I. HYDROSTATICS.

SECT. I. *Of Fluidity.*

THE late Mr. George Adams, of whose estimable writings we propose to avail ourselves in the following treatise, defines a fluid to be a body whose parts are so loosely connected together, that they easily yield to any force impressed upon them, and move freely amongst each other. In this sense, fire, air, mercury, water, &c. are considered as fluids. In almost every physical speculation, wherever experiment can reach, the subject will admit of some illustration; where that is denied, the reasonings are in general vain and conjectural. We do not know the form of the parts of which fluids are composed, and can make no experiments to reduce them into their primary particles.

There is nothing more different in accuracy and truth, than that apprehension which is adequate to the purposes of the vulgar, and that which ought to satisfy the investigation of a philosopher. Thus there is nothing more obvious to the vulgar than *fluidity*, yet the philosopher finds it a property difficult to be conceived, and which he could not give credit to, if it was not rendered familiar to him by custom and experience; it is a physical phenomenon which has not yet been explained, and of which it is very difficult to give a clear account. How, indeed, can we comprehend, that a material and incompressible substance can be composed of parts so elementary, so moveable among themselves, and yet with so little adherence, as to assume immediately the form of any vessel into which it is poured; that its surface is always parallel to the horizon, or perfectly level; that in syphons, or when agitated by the wind, it makes isochronic vibrations, or undulations like a pendulum; that it runs off where favoured by the smallest descent? &c. &c.

Fluidity is caused by a certain degree of fire, which, when employed for this purpose, disappears with respect to any other sensible or perceptible effect. It does not dilate the volume, but resists the particular attachment of the parts. Some have endeavoured to give mechanical ideas of a *fluid body*, by comparing it to a heap of sand; but the impossibility of giving fluidity by any kind of mechanical comminution, will appear by considering two of the circumstances necessary to constitute a fluid body: 1. That the parts, notwithstanding the greatest compression, may be moved, in relation to each other, with the smallest conceivable force, or will give *no sensible resistance* to motion within the mass in any direction. 2. That the parts shall gravitate to each other, whereby there is a constant tendency to arrange themselves about a common centre, and form a spherical body; which, as the parts do not resist motion, is easily executed in small bodies. Hence the appearance of drops always takes place when a fluid is in proper circumstances.

Let us now see how far these qualities may be procured by mechanical operations, even executed without those imperfections that necessarily attend human performance. A body of

sand, the particles of which should be perfectly spherical and polished, or smooth, would only imitate a fluid in being able to spread itself upon a smooth plane, instead of lying in a heap, but would possess neither of the two qualities essential to a fluid body. For a heap of spherical bodies, if compressed, could not move by relation to each other, except by a force sufficient to balance that by which, in this case, they are necessarily retained in their places. Neither can the parts of the supposed body of sand cohere, either to themselves or to other bodies, in the manner of fluids, as in each particle the mass of gravitating matter must be great in proportion to the point of contact by which they should cohere. If the cohesion of the particles of sand increased, the spreading quality would be diminished.

Many other differences might be pointed out; but supposing every thing else favourable to the mechanical theory, yet still there would remain to be explained the operation of fire, which is so essential to fluidity. This would lead us too far, as it would render it necessary for us to investigate the nature of that resistance by which the figure of bodies is preserved in their hardness. By fire hard bodies are made soft; but it is not properly that portion of loose fire which augments the volume of bodies that renders them fluid: their fluidity is occasioned by a *certain quantity of fire, which then disappears, with regard to any other sensible or perceptible effect.*

SECT. II. *Of the Gravity of the Particles of Fluids, and its Effects on the Fluids themselves.*

ALTHOUGH no one finds any difficulty in allowing that water and other fluids are really ponderous, and do actually gravitate when considered as a whole body, being convinced by their own senses, that a vessel weighs less when empty, than when filled with any fluid, and weighs heavier the more it contains; yet, in the early times of philosophy, there were those that believed fluids did not gravitate *in proprio loco*, as they termed it; that is, when immersed in the same, or a different fluid. A simple experiment will shew that they were mistaken, and that fluids lose nothing of their weight *in proprio loco*. Take a hollow glass ball, such as is represented in pl. 18, fig. 5, furnished with a brass stop-cock, and made so heavy as to sink in water. Exhaust it of its air, and then shut the cock. Exhausting the air from it, gives room to a quantity of water equal in bulk to the exhausted air. Suspend it now from the end of the balance, so that the bottle and the stop-cock may be under the surface of the water in the jar, and then counterpoise it by a weight in the opposite scale. If we now open the cock, that the water may run into the bottle, the water will rush in, and the ball will preponderate, and bear down the beam on which it hangs; clearly proving, *that the parts of water retain their gravity in water*, so as to press and bear down upon the parts beneath them, otherwise the phial would not become hea-

view upon the admission of the water; and it will appear that the ball over-balances the counterpoise, as much as the weight of the quantity of water in the ball.

To facilitate the explanation of hydrostatic phenomena, it has been usual for the writers on this subject to consider the fluid in a vessel as cut into several horizontal planes, or imaginary surfaces, and to consist of a vast number of small, equal, lubricous, spherical globules. Thus, fig. 2, pl. 17, A B C D may represent a vessel consisting of such globules, a b, c d, e f, imaginary horizontal surfaces. Besides this imaginary horizontal division of a fluid, they often consider it as divided into perpendicular columns, from the top to the bottom of the fluid, as at fig. 3.

Though fluids are subject to the laws of gravity as well as solids, yet their fluidity occasions some peculiarities necessary to be noticed. The parts of a solid are so connected together as to form but one and the same whole; their effort is as it were concentrated in a single point, called the centre of gravity. This is not the case with fluids; the particles here are all independent of each other, are extremely moveable, yielding to the least effort that tends to separate the one from the other.

The parts of a fluid gravitate independently of each other, and this is a natural consequence of their fluidity, or their not adhering together; whereas the particles of a solid cohere together, and gravitate as one mass. It is clear, from this principle, that if a hole be made in a vessel full of water, the power necessary to prevent the fluid from running out, must be able to overcome the column of the fluid pressing on the hole, and that the weight to be overcome is the same, whether there is only this column of the fluid acting on the part stopping the hole, or whether the vessel be full.

This will be rendered clearer by an experiment, made with the cylindrical glass vessel A B C D, fig. 1, pl. 17, which has a hole at bottom. A cylindrical tube of brass passes through, and is fitted to this hole; a small piston, or plug, is fitted to this tube; and, being well greased, slides easily up and down; a long wire is fixed to this piston, to be hooked on to one arm of the balance E F. On the upper part of this short tube may be occasionally fitted a glass tube, G H, which is exactly of the same diameter as the brass tube, and of the same height with the large vessel.

Having fitted the glass tube in its place, and poured in water up to the mark, put weights into the scale at the opposite arm of the balance, till the piston just begins to rise; then take away the glass tube, and fill the large vessel with water to the same height, and it will be evident that the same weight as before overcomes the pressure. Now as the same weight overcomes the pressure, whether a column of water be only the size of the piston, or whether the vessel be full of water, it is clear that particles of water exercise their gravity independent of each other; but if the mass of water contained in the outer vessel was changed into ice, to raise the piston we must use a weight equal to the weight of the whole column of ice.

The surface of a fluid which is contained in an open vessel, and free from all external impediments, will be level, or parallel to the horizon. No part of a fluid can stand higher than the rest; for, if any part be raised, it must descend by the force of gravity, and, in so doing, will spread and diffuse itself till it is on a level with the other parts; for, having gravity, and yielding easily to every impression, they obey the force of gravity, and slip down till they come to a level.

As the gravity of the particles reduces the upper surface to a level, so likewise it occasions a pressure on the lower part, greater or less in proportion to their depths below the surface, each part containing a pressure equal to the weight of all those that lie above it; consequently, the particles which are at equal depths below the surface are equally pressed. In other words,

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as the upper surface of the fluid is parallel to the horizon, and as the lower parts sustain the upper, and are pressed by them, this pressure will be in proportion to the incumbent matter, that is, *to the height of the fluid above the particle that is pressed*: but as the upper surface of the fluid is parallel to the horizon, all the points of any surface that you may conceive within the fluid, parallel to the horizon, are equally pressed. Should this equality of pressure be at any time destroyed, and there be a less pressure on one part of the surface than on the other parts, the fluid yielding to any impression, this part will be moved, that is, *will ascend till the pressure becomes equal*.

We may confirm this by a simple experiment with a glass tube. Stopping one end with your finger, immerse the other in water. The water will rise in the tube; but the tube being full of air, while you keep your finger upon the orifice, the rise is but small; but if you take away your finger, that the air which is compressed may escape, the water will rise up into the tube, and not be at rest till it attains the same height with the external water.

Solids, we know, make no effort but in the direction of gravity, or perpendicularly downwards; but fluids exert a force of pressure equal to their gravity, in all directions, and in all equality. This follows from the nature of a fluid, for its particles yield to any impression, and are easily moved; therefore no drop will remain in its place, if, whilst it be pressed by a superincumbent fluid, it be not equally pressed on all sides; because, being a fluid itself, it will yield to every impression, and begin to move, unless it be acted upon by equal forces, in all possible directions. But it cannot move, because the surrounding drops resist on all sides its motion with the same force that it endeavours to move, and consequently the drop must remain at rest; and what is thus proved of one drop, holds equally true of all; consequently all the parts of a fluid, at equal depths below the surface, are pressed equally in all directions.

Let us take the several glass tubes, A, B, C, D, fig. 4, pl. 17, which are open at both ends; immerse them in water to the same depth, their upper orifice being stopped by the finger. Upon taking away the finger, the water will rise to the same height in all the tubes, though it enters the lower end in very different directions: in A the pressure is directed upwards, in B downwards, in C sideways, and in D obliquely, but the pressure is equal in each. If we pour a greater quantity of water into the vessel, it will rise equally in the tubes; so that fluids press in all manner of directions, and that with a force proportionable to their heights.

The same experiment is perhaps rendered still clearer by pouring some mercury into tubes. The tubes for this purpose are smaller than those to be used in the former experiment: some of them are straight, and others bent at various angles. Though the tubes are open at both ends, one of the extremities should be closed till after the immersion, to prevent the mercury from falling out. On immersing the lower end of these tubes in water, the mercury will ascend toward the upper end of the tubes. It is to be remarked, concerning this experiment, that whatever be the angles at which the tubes are bent, and however they are inclined to the horizon, if before immersion the mercury in all the tubes be on a level, it will continue so after immersion, provided all the tubes are immersed to the same depth. Consequently, when it has been proved that the pressures of a fluid are as the surface pressed, and their depths from the surface of the incumbent fluid, it will follow, that the pressure of a fluid is not only propagated in all directions, but that the quantities of the pressure at the same depths, and on a given surface, are equal in all directions.

From a cursory view of the subject, some may consider it as

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a kind of mechanical paradox, that the pressure of a fluid upward, or in a direction contrary to that of gravity, should be nothing more than a consequence of gravity itself; but it is very easy to shew, from mechanical principles, that a force acting in a given direction may communicate pressure through a number of intermediate bodies, so that the last body shall be impelled in any direction whatever, even in that which is directly contrary to the original impulse; and this is the case in respect of the particles which compose fluids.

From the foregoing experiments it very clearly appears, that *the perpendicular pressure of any fluid column is, from some unknown connection of the parts, diffused laterally in every direction; and at the same depth, the pressures estimated in any direction are equal to each other.* What has been proved of water, obtains in all other substances that are fluid, and under the influence of gravity.

SECT. III. *Of the Action of Fluids against the Bottoms, Sides, and Tops of the Vessels in which they are contained.*

It is evident that the bottom and sides of a vessel containing a fluid (and the top also, when the fluid is raised above it in a tube) are pressed by the parts of the fluids which immediately touch them; and as action and re-action are equal, *these parts all sustain an equal degree of pressure.*

As the pressure of fluids is equal every way, the bottoms and sides of the vessels are pressed as much as the neighbouring parts of the fluid; but it has been shewn that this action *increases in proportion to the height of the fluid*, and is every way equal at the same depth. This pressure depends on the height, not the quantity of the fluid; consequently, when the height of the fluid, and the area or surface pressed, remain the same, the action upon this surface will always be equal, however the figure of the vessel be changed. In other words, the pressure which *the bottom of the vessel sustains from the fluid contained in it, whatever be the shape of the vessel, is equal to the weight of a pillar of the fluid, whose base is equal to the area of the bottom, and whose height is the same with the perpendicular height of the fluid.*

That this is the case, in vessels that are equally wide from top to bottom, is obvious, because the bottom of such a vessel does actually sustain such a column of fluid, a column in this case equal to the whole weight of the fluid. Here the whole weight of the fluid contained in the vessel, and no other force besides, presses upon the bottom, and is consequently proportional to the quantity of matter contained in the vessel, which quantity is as the surface of the bottom, and the perpendicular height above it. But that the case should be the same in irregular vessels, is not so easy to conceive; for instance, that in a vessel which from a large bottom grows narrower as it rises, the bottom should bear the same pressure when the vessel is filled, as it would were the vessel equally wide throughout from bottom to top, seems strange, yet is what necessarily follows from the nature of fluidity.

Before we proceed to illustrate this proposition by experiment, it may not be improper to explain it by diagrams; considering it, 1. when the vessel is narrower at the top than the bottom; 2. when it is wider at the top than the bottom.

1. Then, if the vessel $M N F T$, fig. 6, pl. 17, is smaller at the top than at the bottom, the pressure upon the bottom, $E T$, is as great as the pressure upon the bottom of a cylindrical vessel, $A B C D$, fig. 7, of equal base and height, when they are both filled with water, or any other fluid, notwithstanding there will be considerably more water in the cylinder than the cone. Make $F G$, $Q R$, in the cylinder, fig. 7, equal to $O R$, the base of the column $M N O R$ of the cone, fig. 6. Now as these columns of water are equal, it is evident that $O R$ in the cylinder and $O R$ in the cone sustain an equal weight, and

consequently an equal pressure. It is also evident, from what has been explained at the beginning of this article, that every part equal to $O R$, at the bottom of the cylinder, is pressed just as much as $O R$. But it is requisite for us to prove, that every part at the bottom of the cone is equal to $O R$ at the bottom of the cylinder; for instance, the part $F I$ is pressed just as much as $O R$ is. It has been shewn that all equal parts of a fluid, at equal depths from the surfaces, are pressed equally; but the drops contiguous to $F I$ and $O R$ are at equal depths from the surfaces: therefore these drops, and consequently the parts $F I$ and $O R$, are equally pressed. Now as every part equal to $O R$, in the bottom both of the cone and cylinder, is pressed as much as $O R$, and since one bottom is equal to the other, it follows, that the whole pressure upon $F T$ is equal to the whole pressure upon $C D$.

But although it appears that the proposition is true, some persons have a difficulty in discovering the reason why it is true; for it certainly does not seem likely, at first view, that $F I$, with no more water over it than fills the space $F E I$, should be pressed as much as $O R$, which sustains the whole column $M N O R$. But it must be remembered, that the water $F E I$ presses upwards against $F E$, as well as downwards against $F I$; and if a hole was made at $F E$, and a tube soldered therein, the water, by the pressure upwards, would be sustained in the tube at the same height that it stands in the vessel; therefore this pressure is equal to the weight of as much water as would fill the tube $C A F E$.

Now the same pressure which would support the water in such a tube acts upon $F E$; but the re-action of $F E$ downwards is equal to the action upwards against it: that is, $E F$ keeps the water down with a force equal to that with which it endeavours to rise, equal to the difference of weight between $F E I$ and $M N O R$: and as $F I$ sustains both the weight of the water $F E I$, and the action or force with which the water is kept from rising, but $O R$ sustains only the weight of water $M N O R$, the pressure upon $F I$ will be equal to the pressure upon $O R$, and the same may be proved of any other column. Therefore the bottom of the cone is as much pressed by the weight of water which fills the cone, and this re-action together, as the same bottom would be pressed by the weight of as much water as would fill up the whole cylindrical space $C B F T$; that is, *the pressure upon the bottom of a conical vessel, is equal to the pressure upon the bottom of a cylindrical one of the same base and height.*

The same mode of reasoning may be applied to the vessel $D B L P$, fig. 8, which consists of two cylindrical parts $N M L P$, a great cylinder at the bottom, and $D B I V$, a lesser one at the bottom. For the pressure upon $L P$, when the vessel is full of water, will be as great as if the vessel was as wide at top as it is at bottom; that is, as great as it would be upon the same bottom $L P$, supposing the vessel was an uniform cylinder, whose base was $L P$, and height $L F$. $L A$, and $O R$, two equal drops at the same depth, are pressed equally; and $O R$ having as much water to sustain, is as much pressed as if the vessel was an uniform cylinder. Therefore $L A$, or $C P$, or any other equal part at the bottom, and consequently the whole bottom, is as much pressed in one case as it would be in the other. Indeed $L A$ or $C P$ have less water to sustain than $O R$; but the column $N T L A$ presses upwards against $N T$ with a force equal to the difference between this column and $D B O R$, or to the weight of as much water as would fill the space $F E N T$; for if a hole was made at $N T$, and a tube, $F E N T$, soldered into it, the pressure against the bottom of the tube would support water in it to the height $N T$, the same height it stands at in the tube $D B I V$. Now as the re-action of $N T$ downwards is equal to the action upwards against it, that is, the force with which $N T$ keeps the water below it,

down against L A, is equal to the force with which this water presses against N T. L A is therefore pressed down not only with the weight of the water N T L A, but likewise by the re-action of N T, which is equal to the weight of as much water as would fill F E N T, and make N T L A equal D B R O; from which it follows, that the weight and re-action together on L A, are equal to the weight on D B R O, by which O R is pressed; and the same may be proved of every other equal portion of the whole bottom and cover; and therefore, by the weight and re-action, L P is as much pressed as if it was the bottom of a cylindrical vessel F H L P, having the same dimensions at the top as at the bottom, and filled with water to the height L F. But to proceed with our subject.

Though the pressure upon F T, fig. 6, is equal to the pressure upon C D, when both vessels are filled with water to the same perpendicular height; yet *if they were filled with ice, or any other solid substance*, instead of water, C D would be more pressed than F T. For C D, whether the vessel be filled with ice or water, sustains the whole weight of the body which rests upon it, and no more; but F T, which, besides the weight M N F T, sustains the re-action of the sides M N F T, when the vessel is filled with water, has *only* the weight to sustain when it is filled with ice; for ice, or any other solid body, does not press upwards. This is a property, which, as it only arises from the nature of a fluid, belongs to fluids only; F T will therefore be only pressed by the weight of the ice, and consequently will be less pressed than C D, in proportion as the cone is less than the cylinder, when their bases and heights are equal. For the same reason L P, fig. 8, if it were full of ice, would be as much less pressed than when it is full of water, as the quantity of matter contained in the compound vessel N M L P is less than the quantity of matter contained in a cylindrical vessel, whose base is L P, and height L F.

The *second case* of the proposition is when the vessel A B O R, fig. 9, is wider at top than bottom. For here also the pressure of any fluid upon the bottom, O R, of it, is the same as in a cylindrical vessel, S T O R, of an equal base, and filled with the same sort of fluid to the same height. For the bottom O R, in either case, sustains just the same quantity of fluid, and consequently the same quantity of matter. If it is the bottom of a cylinder, then it sustains no more than the column S T O R, because the vessel holds no more. If it be the bottom of an inverted cone, as A B O R, then it sustains only the same column; for though the vessel holds more than this, yet all the rest of the fluid is supported by the sides A O, B R, and therefore does not press on the bottom.

Thus we see, that whether a vessel be narrower or wider at the top than at the bottom, the pressure upon the bottom is the same as in a cylindrical vessel of the same base and height; for when it is narrower at the top than at the bottom, though it holds less water than the cylindrical one would, yet the pressure is not less, because the re-action of the sides supplies the defect; and when it is wider at the top than at the bottom, though it holds more water than the cylindrical one would hold, yet the pressure is not greater, because the sides support the excess.

Let us now confirm by experiment, what we have thus endeavoured to render plain without it. The apparatus, fig. 10, is designed for this purpose. It is sometimes called the apparatus of *Paschal*, sometimes the apparatus for illustrating the *hydrostatic paradox*. It consists of three vessels, fig. 11, fig. 12, and A B C D, fig. 10, each of which are of the same size at bottom, and of the same height, and may be screwed alternately on the brass barrel E F, fig. 10, in which a piston slides up and down with ease. One of the vessels, fig. 12, is cylindrical; the other, A B C D, fig. 10, is an inverted cone, wider at top than bottom; the third, fig. 11, is a tube screwed to a plate, which makes the bottom the same size as

that of the other two; it has a funnel at top to prevent the water, in making the experiment, from being spilt.

First screw the cylindrical vessel to the barrel, pushing down the piston as low as it will go, then hook the wire of the piston to the rings from the short ends of the steelyards G H, I K. Now pour water in the cylinder up to the mark in the inside, and find what weights, suspended from the longer arms of the steelyard, will raise the piston; then take the cylindrical vessel from the barrel. Substitute the vessel A B C D, fig. 10, which is like an inverted cone, in place of the former; fill it with water to the mark, as before, and hook on the wire of the piston to the steelyards; and though the quantity of water is now many times greater than what was in the cylinder, yet the same counterpoise will raise the piston. Take off the conical vessel, and screw on the tubular one; and though this holds a much smaller quantity than either of the former, still it requires the same counterpoise. The friction of the piston being the same in every case, makes no alteration in the experiment.

In order to shew that the *lateral pressure* is equal to the perpendicular pressure upon a larger scale, and in a manner which relates more to the preceding experiment, we have delineated an apparatus, fig. 5, with different tubes, that communicate with each other. The middle one is a large glass tube or cylinder, A B; the lower end is firmly cemented into a strong brass hoop; to the sides of this hoop are soldered the brass tubes G, H, into each of which a glass tube is cemented. One of these, E F, is parallel to the large glass vessel A B; but the other, C D, is inclined thereto. The inclined tube is sometimes furnished with a joint, that the inclination may be varied as may be necessary.

If we pour water into the tube E F, this will run through G, into the larger vessel A B, and rise therein; and if we continue pouring water until it comes to any given height, as I K, and then leave off, the surface of the water in the small tubes E F, C D, will be found at the same height; the perpendicular altitude is the same in all the three tubes, however small the one may be in proportion to the other. This experiment clearly proves, that the small column of water balances and supports the large column; which it could not do if the lateral pressures at bottom were not equal to each other. Whatever be the inclination of the tube C D, still the perpendicular altitude will be the same as that of the other tubes, though to that end the column of water must be much longer than those in the upright tubes. Hence it is evident, that a small quantity of a fluid may, under certain circumstances, counterbalance any quantity of the same fluid. Hence also it is evident, *that in tubes that have a communication, whether they be equal or unequal, short or oblique, the fluid always rises to the same height*. Consequently water cannot be conveyed by means of a pipe that is laid from a reservoir to any place that is higher than the reservoir itself.

The ancients, it has been said, were ignorant of this principle, and knew not the use of pipes for conveying water up hills: but this assertion is not true; they did know the use of pipes, but chose to employ aqueducts in their stead, for reasons we cannot now with certainty account for.

Our next experiment proves, with great clearness, the hydrostatic paradox, that very great weights may be balanced by a very small weight of water, without its acting to any mechanical advantage: but, more particularly, it also proves, that its pressure upwards is equal to its pressure downwards, and all this even to those who have no previous knowledge of hydrostatical principles. The apparatus, fig. 1, pl. 18, consists of two large thick boards, C D, E F, connected together by leather, like a pair of bellows; hence it is usually called the *hydrostatic bellows*. A long brass pipe is fixed to the bottom board; so that water being poured in at the top, will pass

between the two boards. We will suppose the boards of the apparatus oval; and that the longest diameter is eighteen inches, the shorter one sixteen. Having poured water enough into the bellows to keep the boards asunder, and put six half hundred weights on the top of the boards, we next pour water into the tube, to the height of three feet, and find it will push up all the weights. Thus the water in the pipe, which weighs but a quarter of a pound, sustains three hundred pounds weight. If we take off the weights, and try, by pressing upon the upper board, to force the water out at the upper tube; our strength will be scarce sufficient for the purpose. Thus we see clearly how great a pressure upwards is exerted by the water.

Another instrument has been invented, for proving that the pressure of fluids is in proportion to their perpendicular heights, without any regard to their quantity.

A B C D, fig. 16, pl. 17, is a box, at one end of which, as at *a*, is a groove from top to bottom, for receiving the upright glass tube I, which is bent to a right angle at the lower end as at fig. 17; and to that end is tied the end of a large bladder K, fig. 17, which lies in the bottom of the box. Over this bladder is laid the moveable board M, fig. 18, in which is fixed an upright wire. Leaden weights N N, fig. 16, to the amount of sixteen pounds, with holes in the middle, are put upon the wire, over the board, and press upon it with all their force. The bar *p* is then put on, to secure the tube from falling, and keep it upright; and then the piece E F G is to be put on, to keep the weights in a horizontal position, there being a round hole at *e*. Within the box are four upright pins, to prevent the board at first from pressing on the bladder. Pour water into the tube at top; this will run into the bladder: and after the bladder has been filled up to the board, continue pouring water into the tube, and the upward pressure of the fluid will raise the board with all the weight upon it, even though the bore of the tube should be so small that less than an ounce of water would fill it.

Upon this principle mathematicians assert, *that the same quantity of water, however small, may produce a force equal to any assignable one, by increasing the height and base upon which it presses.* Dr. Goldsmith mentions having seen a strong hog's-head split by this means. A strong, though small tube of tin, twenty feet high, was inserted in the bung-hole; water was poured in this to fill the hog's-head, and continued till it rose within about a foot of the top of the tube; the hog's-head then burst, and the water was scattered about with incredible violence.

As the bottom of a vessel bears a pressure proportional to the height of the liquor, so likewise do those parts of the sides which are contiguous to the bottom, because the pressure of fluids is equal every way; and as the pressure which the lower parts of a fluid sustain from the weight of those above them exerts itself equally every way, and is likewise proportional to the height of the incumbent fluid, the sides of a vessel must every where sustain a pressure proportional to their distance from the upper surface of the liquor. Whence it follows, that in a vessel full of liquor, the sides bear the greatest stress in those parts next the bottom; and that the stress upon the sides decreases with the increase of the distance from the bottom, and in the same proportion; so that in vessels of considerable height, the lower parts ought to be much stronger than the upper, to be able to withstand the greater degree of pressure to which they are exposed.

SECT. IV. *Of the Action of Fluids on Bodies immersed in them.*

THE ancient philosopher *Archimedes*, in his two books *De insidentibus humido*, is the first we know of who made enquiries concerning the sinking and floating of bodies in fluids; their relative gravities, their levities, their situations, and positions.

He was also probably the first that ever attempted to determine in what proportion bodies differ from one another as to their specific gravities, and this he effected in order to discover the cheat of the workmen, who had debased king Hiero's crown; and though the means he employed were certainly much inferior to what would now be used, yet was he so pleased with his discovery, that not being able to contain his joy, like a madman leaping from the bath naked as he was, he is said to have run about the streets of Syracuse, crying out *Eureka* wherever he came. Before we proceed to explain this interesting subject, some terms which have only been as yet loosely explained must be defined.

1. *The density of a body is the quantity of matter which it contains under a given bulk.* The density of a body is therefore measured by the proportion which its quantity of matter bears to its bulk; for, the more numerous the particles of matter are in the same portion of space, the greater is the density of the body, and the fewer the particles the less the density.

2. *The specific gravity of a body is the weight of it when the bulk is given; or, the specific gravity of a body is its weight compared with another body of the same magnitude.* It is called the *specific gravity*, because it is the comparative weight of different species or sorts of bodies. Thus, if the specific gravity of gold is said to be to that of water as 19 to 1, the meaning is, that, bulk for bulk, or under equal dimensions, the weight of gold is to that of water as 19 to 1; or that a cubic inch of gold will weigh 19 times as much as a cubic inch of water.

3. *The specific gravity of bodies is as their density,* for the specific gravity is the weight of a given bulk, and the weight of bodies is as their quantities of matter; therefore the specific gravity of a body is as the quantity of matter contained in a given bulk, that is, as its density.

4. *The specific gravity of bodies is inversely as their bulk when their weights are equal.* The specific gravity of bodies is, we have already seen, as their density, and the density of bodies is inversely as their bulk when the weights are equal. Thus, if the specific gravity of gold be to that of silver as 19 to 11, and a cylinder of gold 11 inches high weigh a pound, a cylinder of silver having an equal base and weighing a pound must be 19 inches high; for since the specific gravities are 19 to 11, the bulks, that is, the heights must be as those gravities inverted, or as 11 to 19. If the specific gravity of mercury be to that of water as 14 to 1, and a cylinder of mercury of a certain weight is 30 inches high, then a cylinder of water of equal base must be 420 times as high; so that the height of the cylinder of water will be 14 times 30 or 420 inches, or 35 feet.

The *magnitude* of a body is expressed by a number denoting its relation to some criterion generally used, and similar to itself, as a cubical inch, foot, &c. The *absolute weight* of a body is relative, being expressed by a number denoting its relation to some arbitrary or conventional standard, as 1 pound, 1 ounce, of which it is a multiple or aliquot part; and in the same sort of matter, supposed to be homogeneous, it depends upon and varies as the magnitude.

The specific weight or gravity of the same species of matter, whether its magnitude be great or small, as of *A*, 2 *A*, or 3 *A*, is the same, being according to the definition of the weight of a given bulk. The object therefore of specific gravities is to distinguish different species of matter from each other, in one of their most obvious qualities, weight of matter contained in a given space.

The weight of any portion of matter is easily ascertained, but it is not always easy to measure the space occupied by a body or its *magnitude*, and in some instances it cannot be effected without artificial methods. It is found expedient to em-

ploy as a criterion some pure and homogeneous substance, as distilled water, whose specific gravity or weight of a given bulk is nearly the same at all times; and by comparing this with other substances, the ratio of their specific gravity may be discovered; and denoting the specific gravity of water by any number taken at pleasure, the numbers expressing the specific gravities of other bodies are hence obtained.

It follows, from what has been already demonstrated in the foregoing part of this treatise, *that when a solid is immersed in a fluid, it is pressed by that fluid on all sides, and that pressure increases in proportion to the height of the fluid above the solid*: but we may also prove it directly by experiment. Thus, tie a leather bag to the end of a glass tube, and fill it with mercury, immerse the bag in water, but so that the upper or open end of the tube may be always above the surface of the water; the pressure of the water against the bag will raise the mercury in the tube, and the ascent of the mercury will be in proportion to the height of the water above the bag.

When a solid is immersed in a fluid to a great depth, the pressure against the upper part differs very little from the pressure against the under part, whence bodies very deeply immersed are as it were *equally pressed on all sides*; but a pressure which is equal on all sides may be sustained by soft bodies without any change of figure, and by very brittle bodies without their breaking. Take a piece of soft wax of an irregular figure, and an egg, and inclose them in a bladder full of water; place it in a square box, and put on a moveable cover, which will bear on the bladder; there may be placed on this cover a weight of 100 or even 150 pounds, without breaking the egg, or any ways altering the figure of the wax.

It has been already shewn, that fluids press upon bodies to which they are contiguous every way, and on all sides, but the pressure upon each part is not the same; the *altitude* of the fluid is every where the measure of its force, and the several parts of the same body being at different depths, must needs be differently affected: we have therefore to consider which of these impressions will prevail.

Now it is evident that the *lateral* pressures do all balance each other, being equal, as arising from equal altitudes of the fluid, and opposite in their directions; so that from these the body is no ways determined to any motion. But a body immersed in a fluid is pressed more *upwards* than it is downwards; for those parts of the fluid which are contiguous to the under surface have a greater altitude, and therefore a greater force than those that are contiguous to the upper surface; the body must therefore be more violently elevated by the former than depressed by the other, and would therefore ascend by the excess of force, were it devoid of gravity. For when a solid body is immersed in a fluid, it presses down, and endeavours to descend by the force of its gravity; but it cannot descend without moving as much of the liquid out of its place as is equal to it in bulk: it is therefore resisted, pressed upwards by a force equal to the weight of as much of the fluid as is equal in magnitude to the bulk of the body, being the difference in weight of two columns of the fluid, whereof one reaches to the upper, the other to the under surface of the body.

Let us endeavour to illustrate this by a diagram. When any hard body, as a piece of lead, is immersed in water, the lower part of it ($m n$) fig. 13, pl. 17, must be continually pressed upwards just as much as the water itself in the same place as the lead is pressed upwards. Now the force with which the water ($m n$) is pressed upwards, is exactly equal to the force with which it would be pressed downwards if the lead was out of the way; for every part of a fluid is pressed as much upwards as it is downwards. The force with which ($m n$) would be pressed downwards if the lead was out of the way, would be equal to the weight of the incumbent column, or of as

much water as would fill the whole space $E H m n$; therefore the force with which $m n$ is pressed upwards, and consequently the force with which the piece of lead is pressed upwards, is equal to the weight of as much water as would fill the whole space $E H m n$, or the whole space $H P n o$, if this space be taken equal to $E H m n$.

Let us next consider the force with which this piece of lead is pressed downwards: this force is just equal to the weight of as much water as is above it, that is, it is equal to the weight of the column $E H r s$.

The difference therefore of the two pressures will be the difference in weight between the two columns $E H m n$, $E H r s$; for the weight of the former is equal to the pressure upwards, and the weight of the latter is equal to the pressure downwards: consequently the pressure upwards will be as much greater than the pressure downwards, as the weight of the water $E H m n$ is greater than the weight of water $E H r s$. But the difference between these two weights is just as much as would fill the space $r s m n$, which the body fills; for just so much water added to $E H r s$, would make it equal $E H m n$: consequently *the body is pressed more upwards than it is downwards by a force equal to the weight of as much water as would fill the space taken up by the body*. In other words, the body is acted upon by two forces in contrary directions, but the force with which the fluid acts upon it to make it ascend exceeds the force by which it presses downwards; and this excess is equal to the weight of as much of the fluid, whatever it is, as would fill the space taken up by the body.

The case will be the same whatever be the figure of the body immersed; for suppose it to be a cone $T S L V$, fig. 15, pl. 17, then as every equal part of a fluid at the same depth is pressed equally in all directions, if $V I$ be equal to $L V$, it follows, that these two parts of a thin sheet of fluid $F E$ will be pressed upwards by equal forces; but $V I$ is pressed as much upwards as downwards, therefore $L V$ is pressed as much upwards as $V I$ downwards.

Now the force that presses $V I$ downwards is the weight of the fluid $H P V I$ that is above it; consequently $L V$, where the bottom of the body is placed, is supported by a force equal to the weight of the column $H P V I$, and this column is equal to $M H L V$. Therefore the body is pressed upwards with a force that is equal to a weight of as much of the fluid as would fill the whole space $M H L V$.

The same body is in the mean time pressed downwards by the weight of all that fluid that is above any part of it, that is, by the weight $L T S V H M$, and not merely by the column $O N T S$, which reaches from the surface to the top of the body. From hence it follows, that the difference between the centre column $M H L V$, or such a column as this would be if the body was out of the way, and the column $L T S V H M$, is the difference between the pressure upwards and the pressure downwards. But this difference is plainly equal to as much of the fluid as would fill the space the body takes up; the force therefore by which the fluid acts upon the body to make it ascend, exceeds the force by which it presses downwards, and this excess is equal to the weight of as much of the fluid as would fill the space taken up by the body.

But as all bodies by the force of gravity tend downwards, it is clear from what has been said, that it depends upon the absolute weight of the immersed body whether it shall ascend or descend. 1. If the weight of the body exceed that of an equal bulk of the fluid, the excess of force will tend downwards. 2. If the weight of the body be less than an equal bulk of the fluid, the upward pressure will prevail, and it will ascend. 3. If both be precisely equal, the body will remain at rest in any part of the fluid.

First, then, *a body immersed in a fluid will sink if it be specific-*

cally heavier than that fluid; for it endeavours to descend by its own weight, and is supported by a force equal to the weight of an equal bulk of fluid, or of as much fluid as will fill the space taken up by the body. If therefore the body be specifically heavier than the fluid, i. e. bulk for bulk heavier than the fluid, its weight will be greater than the pressure upwards of the fluid which is to support it; and, consequently, this pressure will not so support as to keep it from sinking.

If we throw a stone into the water, it sinks, for it is specifically heavier than the water; that is, where the bulks are equal, the weight of the stone is greater than the weight of water; therefore the force with which it endeavours to descend is greater than the excess of pressure upwards, which is all there is to support it; which being too weak to sustain it, the stone sinks to the bottom.

A body that is immersed in a fluid will rise to the surface, and swim upon it, if it be specifically lighter than the fluid. A piece of cork, when it is immersed in water, is pressed by the water both upwards and downwards; but the pressure upwards exceeds the pressure downwards, and this excess is equal to the weight of as much water as is of the same bulk with the piece of cork; therefore, as far as the action of the water is concerned, the cork ought to rise to the top; and the cork itself being also specifically lighter than water, the force with which it endeavours to sink is less than the force which buoys it up; it must therefore on this account rise till it comes to the surface. Hence the reason is plain, why fir, oak, and elm, that are specifically lighter than water, will swim in it; while ebony and guaiacum, that are specifically heavier, will sink.

There is generally a part of any body that floats on the water below the surface, and this part is equal in bulk to as much of the fluid as would weigh what the body weighs. Let p, t, e, i , fig. 14, pl. 18, be a piece of cork, then s, n, e, i , the part below the surface $A B$ of the water, will be equal in bulk to as much water as would weigh what p, t, e, i , the whole cork weighs. The force with which the water at e, i , is pressed upwards, is exactly equal to the force with which it would be pressed downwards if the cork p, t, e, i , was out of the way, because every part of a fluid is pressed equally in all directions.

But the force with which e, i , would be pressed downwards if the cork was away, is equivalent to the weight of as much water as would fill the space taken up by the part of the cork below the water; and consequently the force with which e, i , the bottom of the cork, is pressed upwards, is equivalent to the weight of as much water as would fill up the space s, n, e, i , or the part of the cork below the surface. If therefore the part which is below the surface has the same bulk as a quantity of water that would weigh what the whole cork weighs, then the pressure upwards will be equal to the weight of the cork, and keep it from sinking.

A body that has the same specific gravity with the fluid into which it is immersed, will rest in any part of the fluid wherever it happens to be placed. For the body endeavours to descend by its own weight, and is prevented from descending by a force equal to the weight of an equal bulk of fluid; but when the body and the fluid are of the same specific gravity, equal masses of each are of the same weight, and consequently the force with which the body endeavours to descend, and the force which opposes the descent, are equal to each other; and as they act in contrary directions, the body will rest between them, so as neither to sink by its own weight, nor to ascend by the pressure of the fluid upwards.

It is manifest from these positions, that if by any contrivance the specific gravity of a solid can be varied so as to be one while greater, another less, and then equal to the specific gravity of the fluid wherein it is immersed, the body will sink, or rise or remain suspended, according to the variations of its

specific gravity. And this is the case in the experiment with those little glass images that some philosophers exhibit, which are made to ascend or descend, or remain suspended at pleasure.

The images being set to float on the water, the top of the vessel must be covered with a bladder closely bound about the neck of the vessel, to the end that the air which lies on the surface of the water may not force its way out when it is condensed by the hand. The images themselves are nearly of the same specific gravity with the water, but rather a little lighter, and consequently float near the surface: the images being hollow are full of air, which, by means of small holes in their heels, communicates with the air without. When the air which lies beneath the bladder is pressed by the hand, it presses on the surface of the water; and as the pressure is propagated through all the water, those portions which are contiguous to the heels of the images are thereby forced into the holes; by which means the air within is condensed, and at the same time the weight of the images is increased by the weight of the influent water; and when so much water is forced in as to render the specific gravity of the images greater than that of the water, the images descend to the bottom, where they remain as long as the pressure above continues; but when that is taken off by the removal of the hand, the condensed air in the images dilates and expands itself, and in so doing drives out the water, upon which account the images become specifically lighter than water, and of course ascend. As the pressure on the bladder is greater or less, so must the quantity of water be which is forced into the images; and therefore whenever it happens, that during the ascent or descent of an image, such a pressure is made as suffices to force in just as much water as is requisite to reduce the image to the same specific gravity with the water, the image stops, and remains suspended; upon increasing the pressure it descends, and ascends if it be lessened. Some of the images begin to descend sooner or rise later than others, either because they are specifically heavier, or because the cavities in their legs are greater in some images in proportion to their magnitudes, than they are in others. This is but an experiment of mere amusement; many and more important uses are the result of our being able to determine the specific gravities of bodies: to this, therefore, we shall now proceed.

All bodies, when immersed in a fluid, lose the weight of an equal bulk of that fluid; in other words, every body immersed in a fluid loses a part of its gravity equal to the weight of the fluid, which would fill the space taken up by the body. A piece of lead, or of any other substance, when it is immersed in water, is not so heavy as when it is out of water; for the water presses it more upwards than downwards, and the excess of the pressure upwards will support part of the weight. But this excess was shewn to be equivalent to the weight of as much water as has the same bulk with the lead; and consequently since the body immersed must lose as much of its weight as the fluid can support, the lead will lose the weight of an equal bulk of water.

Thus a cubic foot of lead r, s, m, n , hanging by the string $L I$, fig. 13, pl. 17, will weigh less in the water than it does out of it, because the water by its pressure upward against the lead will support a cubic foot of water, or one thousand avoirdupois ounces, for so much a cubic foot of water weighs, and consequently so much of its weight the lead must lose. Again, a body endeavours to descend by its whole weight; when it is immersed in a fluid, it is supported by a force equal to the weight of the same bulk of that fluid; and since these two forces act in contrary directions, the weight which the body retains in the fluid will be the difference between them, or it loses the weight of an equal bulk of the fluid.

The following experiment will render the position self-evident. The apparatus for it consists of a beam, a small hollow

cylindric bucket A B, and another cylinder C D, which precisely fits the capacity of the bucket A B, fig. 2, pl. 18, (only a portion of one arm E F of the beam is represented in this figure). First, suspend the bucket by one end of the beam. At the bottom of the bucket is fixed a strong thread of silk with a loop on the lower end; to this loop the close cylinder is suspended. It is necessary to counterpoise these by a weight at the other end of the beam. Then set a jar of water under the cylinder, and gently lower the beam, and it will become lighter and lighter upon the beam as the cylinder descends. When it is quite immersed, the equipoise is destroyed by the descent of the weight of the other arm. To shew how much weight is lost by the cylinder, add the weight of a quantity of as much water as is equal in bulk to the cylinder; that is, fill the bucket, which you know is exactly the same size; and by doing it gradually, you will observe the equipoise restored by degrees till the bucket is full, and then the beam becomes truly horizontal as at first, the loss of weight being restored by the equal cylinder of water in the bucket.

It is evident from what has been said, nor can it but be seen clearly, whence the loss of weight proceeds. It is no otherwise lost than as it is sustained by the action of a contrary force; and it becomes therefore obvious, why the weight of a bucket of water is not perceived while it is in the water, not because that weight is destroyed, but because it is supported; not because fluids do not gravitate when they are in fluids of the same sort, but because there is a pressure in a contrary direction which is exactly equal to their gravity.

Since the weight which a body loses when it is immersed in a fluid is always the weight of as much of that fluid as is equal in bulk to itself, it follows, that the weight lost by the body cannot at all depend either on the depth of the fluid itself, or the depth to which it is immersed therein. An anchor loses no more of its weight when it is at the bottom than when it is just below the surface, for in either case it loses the weight of as much water as is equal in bulk to itself. It is not more easy to swim in deep than in shallow water, provided the water is not so shallow as to prevent one from striking freely; for whatever is the depth of the water, a man loses the weight of as much water as is equal in bulk to his own body; for which reason, shallow water will buoy him up with as great force as deep water. Indeed it is easier to swim in the sea than in a river, because salt water is specifically heavier than fresh; and as a man loses the weight of as much salt water as is equal in bulk to his body, and in the river loses only the weight of an equal bulk of fresh water, the weight lost here being greater, salt water will buoy him up with the greatest force.

There are very few, if any animals, that are specifically heavier than common water. The substances indeed of both animals and vegetables are specifically heavier; the floating of either is therefore to be attributed to the cells or receptacles interspersed within them, which are filled with air, oil, &c. substances lighter than water; so that, taken together, they form a mass specifically lighter than a comparative bulk of common water.

We should also observe on this subject, that the bulk of the body is increased by distending the chest in inspiration. This has been proved by an experiment on a fat man of an ordinary size, by finding what weight he could support so as to have the top of the head just above water. When his chest was full of air; he was found to rise with fourteen pounds of lead without striking out in the least, and two ounces more would have kept him under; but when his breast was not thus distended, he could only bring up eleven pounds.

All equal solids, though of different specific gravity, when they are immersed into the same fluid, lose an equal weight. The weight which gold, or silver, or lead, or stones, or any other

body loses in water, does not at all depend upon the sort or figure of a body, but upon its bulk or size. The stone loses the weight of an equal bulk of water, so does the lead; when, therefore, they are of the same size, they each of them lose the weight of the same quantity of water, that is, they lose an equal weight: but if two bodies of the same sort differ in size, they will lose different weights in proportion to their size.

In order to prove that the loss of weight is not affected by the absolute weight of the body, but depends on its size, it is only necessary to alter the weight of the cylinder, by adding to or diminishing the number of shot contained in it, and then repeat the experiment with it and the bucket as before, and the event will be the same. In the same manner too it may be shewn, that all bodies, however different their specific gravity may be, if their magnitudes be equal, do suffer an equal loss of weight in the same fluid. Thus a cylinder of block-tin, equal in dimensions to the brass cylinder, but specifically lighter, being immersed in water, will lose the same weight.

Bodies of the same weight, but of different specific gravities, lose unequal parts of their weights when they are immersed in the same fluid. Thus suppose a piece of gold in one scale to weigh just as much in air as a piece of copper in the other scale. Now hang each by a horse-hair on the hooks of the balance, and let them down into the glass vessels; and as soon as they are immersed in the water, the equilibrium will be destroyed, and the gold will outweigh the copper; for, as they are of equal weight, their bulks are as their specific gravities; that is, the gold will be as much less than the copper as the specific gravity of the gold is greater than that of copper: the gold, therefore, because it is the smaller of the two bodies, will lose less of its weight in water than the copper does, and will consequently outweigh the copper.

On the other hand, if the gold and the copper are made of the same weight, when they are under water, then by drawing them out of the water the copper will become the heavier; for when they were under the water, each of them lost as much of their weight as the water could sustain, that is, each of them lost a weight in proportion to its bulk: but the copper being the bigger of the two, lost the greater weight; and as the weight which they lost in water is recovered upon their being drawn up in the air, the copper recovers more weight than gold, and will therefore outweigh the gold.

The weight lost by a solid immersed in a fluid is communicated to the fluid. Though a solid loses part of its weight when immersed in a fluid, we are not to suppose that the weight so lost by the solid is actually destroyed, but that it is imparted to the fluid, the fluid constantly gaining what the solid loses; for if we put the vessel with the water wherein the cylinders were immersed into a scale, and counterpoise it, it will appear upon the immersion of the cylinder that it will preponderate with exactly the same weight that the cylinder loses.

Before we proceed to the methods of discovering the specific weight of bodies, it will be necessary to note two curious facts, to shew how lead or gold may be made to swim upon water, or how a light body like wood may be made to remain sunk at the bottom of a vessel of water.

A body that is specifically heavier than a fluid, may be supported in it by the pressure upwards, if the pressure downwards is taken away. As bodies specifically heavier sink, because the force wherewith they press downwards exceeds the pressure from beneath which opposes their descent, and the force wherewith they descend is equal to the difference of those pressures; if by any contrivance those two forces can be reduced to an equality, then the bodies will not descend, but remain in the fluid. To shew this, let a circular brass plate be exactly fitted so as to cover the lower aperture of a cylindrical tube. Keep it close to the tube by means of a string, and then immerse the tube perpendi-

cularly in water till the plate of brass is plunged therein somewhat more than eight times its own thickness. When at this depth, the piece of brass is supported by the pressure of the water, and does not sink although you let go the string. The brass endeavours to descend by its own weight, it is pressed upward by a weight equal to that of a cylindrical column of water, having the same base with the brass plate, and being eight times thicker; and because brass is eight times specifically heavier than water, the weight of a cylindrical column of water which presses upward, and the weight of the brass by which it endeavours to descend, will be equal, and consequently the brass will be just supported in equilibrio.

Again, *a body that is specifically lighter than the fluid in which it is immersed, will not rise if the pressure upward is prevented.* To prove this, let there be a bit of cork so fitted to the bottom of a cylindrical vessel, (fig. 10, pl. 19,) that the surfaces shall be every where in contact: now, if you pour mercury into the vessel, you will find that the cork will not ascend till it be separated from the bottom of the vessel. *a* represents the cork, and *b* the mercury. The effect of a fluid's pressure in a direction contrary to that of gravity is here evinced by a very decisive experiment; as long as the fluid is prevented from communicating with the under surface, the cork continues attached to the bottom of the vessel partly by its own weight, and partly by the pressure of the mercury on its upper surface.

From what has been said we necessarily discover the rationale of *sinking* and *swimming*. We saw that when a body was bulk for bulk heavier than the fluid, by being immersed it loses only the weight of an equal bulk of the fluid, and consequently the *residual* or remaining gravity of the solid must carry it down to the bottom, or make it *sink*. On the other hand, if the solid has less weight in the same bulk than the fluid, then it cannot by its weight displace or raise upwards its whole bulk of the fluid, but only so much of it as is equal to its own weight; and from this deficiency in weight it will be only partly immersed, and will therefore *swim* upon the upper part of the fluid.

Man, of all the animals, whenever thrown into the water is the most helpless. The brute creation receive the art of swimming from nature, while man can only acquire it by practice; the one escapes without danger, the other sinks to the bottom. Some have asserted, that this arises from the different sensibilities each have of the danger; the brute, unterrified at his situation, struggles, while his very fears sink the lord of the creation. But much better reasons may be assigned for this impotence of man in water, when compared to other animals; and one is, that he has actually more specific gravity, or contains more matter within the same surface than any other animal. The trunk of the body in other animals is large, and their extremities proportionably small; in man it is the reverse, his extremities are very large in proportion to his trunk. The specific weight of the extremities is proportionably greater than that of the trunk in all animals, and therefore man must have the greatest weight in water, since his extremities are the largest.

Besides this, other animals to swim have only to walk (as it were) forwards upon the water; the motion they give their limbs in swimming is exactly the same they use upon land; but it is different with man, when making use of those limbs to help him forwards upon water, which he employs to a very different purpose upon land.

SECT. V. *On the Methods of estimating the Specific Gravity of Bodies.*

FROM the principles laid down in the preceding sections, it

will be easy to shew in what manner the specific gravities of different bodies, whether solid or fluid, may be estimated. The specific gravity of a body is the weight of that body, under a known and determinate magnitude; as a cubic inch, a foot, &c. To acquire this knowledge, the body is to be weighed *hydrostatically*; that is, 1. in air; 2. in water. We know that a body immersed in water displaces a volume of water exactly equal to its own, and that it loses a portion of its weight exactly equal to the volume displaced; we therefore obtain by this mode, 1. the weight of the body; 2. the weight of a volume of water perfectly equal in bulk to that of the body. These two weights, compared together, give the relation between the specific gravity of water, which we suppose to be known, and that of the given body, by making the following proportion, in which 1000 * represents the specific gravity of water. The weight of the volume of water displaced by the body, is to the weight of this body, as 1000 is to a fourth term representing the specific gravity of this body: for the specific gravities are as the weights of equal bulks; therefore the specific gravity of the fluid is to that of the body, as the weight lost in the fluid is to the whole weight.

Now, let us suppose a piece of gold to weigh 38 grains in air, and only 36 grains when weighed in water; it has therefore lost two grains. Reasoning therefore from what has been already proved, we say the gold has lost the weight of as much water as is equal in bulk to itself. But the gold itself weighs 38 grains; consequently, bulk for bulk, the weight of water is to that of gold, or the specific gravity of the fluid to that of the solid, as 2 to 38; that is, as the weight of the fluid is to the whole weight. Thus the whole art of comparing the specific gravity of bodies, consists in finding out what the body weighs in air, and how much of that weight is lost in water; and then dividing the first weight by the difference between the first and second weight, and the quotient of this division shews how many times the body is heavier than water.

The definition of *specific gravity* implies comparison. Some kind of body must be fixed upon, whose gravity must be made a standard for the gravity of other bodies of equal bulk to be compared with. This standard body should have two properties; first, it must be easy to be had or come at upon all occasions; and secondly, it should be of as fixed and unalterable a nature as possible, that there may be no variation in its gravity in equal bulks, in different times or places. Now as the best way of discovering the specific gravities of bodies is by immersion, the body must be of the fluid kind; and, among fluids, *water* is that which possesses in the highest degree the requisites for a standard. Distilled water is the least objectionable, next to this pure rain-water; but common water, for many purposes, will answer very well.

The specific gravity or weight of a given bulk of distilled water is nearly at all times the same; and by comparing this with other substances, the ratio of their specific gravities may be discovered; and denoting the specific gravity of water, by any number taken at pleasure, the numbers expressing the specific gravities of other bodies are hence given.

As the weight of one cubical foot of pure distilled water is equal to 1000 ounces avoirdupois, if its specific gravity be denoted by 1, or .000, the weight of one cubic foot, or other measure, of other substances, is hence found, and tables of the specific gravities of bodies are formed. One ounce avoirdupois is equal to 437.5 grains, and an ounce troy to 480 grains; consequently, one avoirdupois pound is to one troy pound, as 437×16 to 480×12 , or as 1750 to 1440. A cubic foot of

* In hydrostatic calculation, water, as the standard from which all the respective gravities are taken, is reckoned as unity, or 1, 10, 100, 1000, &c. as the case requires.

water is equal to 1000 ounces avoirdupois, or 62.5 lb. avoirdupois; whence we find it to be equal 75.95 lb. troy. A cubic inch of water is equal 253.18 grains, or .57869 parts of an avoirdupois ounce; and 253.18 grains, or 5274 parts of one troy ounce.

SECT. VI. *Of the Use of the Hydrostatic Balance, in determining the Quality of Gold, &c.*

BEING able to determine the specific gravities of bodies, we are thence enabled, by weighing metals in water, to discover their adulterations or mixtures, with greater exactness than by any other method whatsoever. By this means the counterfeit coin, which may be offered as gold, will be easily distinguished, and known to be a baser metal.

The principal and distinguishing qualities of pure gold are, the simplicity, minuteness, and close cohesion of its parts; whereby a greater number of those parts is contained in less space than any other body with which we are acquainted. As all bodies weigh in proportion to their quantity of gravitating matter, under the same bulk, the specific weight of gold must be superior to that of other metals. It follows from hence, that if gold be adulterated with any other metal, its *specific gravity*, or comparative weight, must be *less* in proportion to the quantity of *alloy*. The weight therefore of gold is a sure criterion of its quality.

In order to determine the precise quantity of alloy compounded with gold, gold must be weighed with some other mass as a *standard*, and their relative gravities be computed. It has been already shewn, that water is the most convenient standard. Weigh a piece of gold first in air, weigh it then in water, subtract its weight in water from the weight in air, and the difference shews the *loss* it has sustained by being weighed in a denser medium. Divide the *weight in air* by the *loss in water*; the quotient shews the specific gravity, or how many times gold is heavier than water. On the contrary, the specific gravity of *sterling gold* being known, if the *weight in air* of any piece of gold coin be divided by the *specific gravity* of sterling gold, the quotient shews what ought to be its *loss* in water; and if it be found to lose more, the gold is bad, or has too great a quantity of alloy.

Gold is about eighteen times as heavy as common water; the specific gravity of sterling gold being to the weight of water 17.793 to 1. If therefore a guinea weighs in air 129 grains, when weighed in water it must lose 7.25, or $7\frac{1}{2}$ grains of its weight; because as 7.250 is to 129, so is 1 to 17.793; so that a quantity of water equal in bulk to a sterling guinea weighs $7\frac{1}{4}$ grains.

SECT. VII. *Of the Hydrostatic Balance.*

THE beam of the hydrostatic balance is in general made from eight to ten inches long, and with the perfections necessary to a good balance-beam. It either rests upon a stand or fulcrum, as at fig. 3. pl. 18. or is pendent, as at fig. 4. To this beam are adjusted a pair of scale-pans, which may be taken off at pleasure. There is also another smaller pan, of equal weight with one of the others, furnished with shorter strings, so as to admit a vessel of water to be placed under it. When the balance is used for hydrostatic purposes, this pan is to be suspended at one end of the beam, and one of the common scale-pans at the other end.

The glass *bucket* is to hold any solid body to be weighed in water, and is to be suspended by the horse-hair to the hook at the bottom of the small scale. There is a weight to be placed in the opposite scale, in order to balance the bucket exactly in water. The brass *tongs* are for the same purpose, and to hold such substances as cannot conveniently be put into the bucket.

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The small brass *nipper* is intended for weighing of gold coin; which may be more accurately weighed by this than in the *bucket*, which is principally designed for such things as cannot well be placed in the nipper or tongs: the beam will turn much easier with either of these than with the other. A scale-beam, loaded at each end with a considerable weight, is insensible of the addition of a small one: besides, the resisting medium of water, through which the whole surface of the bucket and its contents must pass, lessens the vibration of the beam, and renders the operation both tedious and uncertain. The glass solid is made use of to determine the specific gravity of fluids.

Each of these appendages has a respective weight, for a *balance in water*, which are distinguished by different marks. These weights are intended to balance them *exactly*; but their correctness may be injured by different circumstances, for water varies considerably in its density, according to the temperature of the air; in hot weather it is lighter, in cold it is heavier; in the former case the balance may appear rather too light, and in very cold weather rather too heavy. Whenever this happens, we restore the equilibrium by a small weight, dropped into the scale that requires it, before any hydrostatic experiments can be performed with accuracy. From hence it is natural to conclude, that the specific gravity of the same substances will be different at different times: this variation is however so small, particularly in the weight of gold, as not to be regarded in common experiments. For easier computation, it is best to use tenths of grains for the subdivisions in these experiments.

SECT. VIII. *To find the Specific Gravity of Solids.*

In order to find the specific gravity of solids, weigh the substances first accurately in air, setting down with a pen the weight in grains and decimal parts: then hang on the small water-scale to one end of the beam; place under it the glass vessel, pouring water in till it be filled to within three quarters of an inch from the brim. Let the body to be weighed be then placed in the nippers, tongs, or bucket, as is most convenient; and, immersing it in the water, let it be suspended by the horse-hair to the hook at the bottom of the water-scale. In this proceeding, we must take care that the same weights that balanced the body in air be in the opposite scale, and likewise the proper *balance water-weights*, and that no air-bubble adhere to any part of the substance in the water, which will render it apparently lighter. The *opposite* scale to that which contains the substance will now greatly preponderate; weights should therefore be put into the water-scale till the equilibrium be restored.

The pen will now finish the operation. Divide the *weight in air* by the *loss in water*; that is, divide the number of grains in the large scale by those in the small one, and the quotient will shew the specific gravity, or how many times heavier the substance that was weighed is than water. If the weight in the small scale be *subtracted* from that in the other, it will shew the *relative gravity* of the weighed substance, or the weight with which it will be evenly balanced in water.

SECT. IX. *Method of finding the Specific Gravity of Fluids.*

SINCE, by the term *specific gravity* of bodies, nothing more is meant than the difference, or comparative weight of those bodies to that of common water, we might easily find the specific gravity of any kind of *fluid*, by weighing a quantity of it against an equal quantity of water; but as a solid body, when immersed in a fluid, loses as much of its weight as a bulk of the fluid equal to the body weighs, a more convenient and accurate method is the immersion of a *solid* of some determinate weight in the fluid whose specific gravity we desire to know. Adapted to this purpose is the conical piece of *solid glass*, belonging to

the hydrostatic balance; whose weight both in air and water being known, shews immediately the weight of the fluid into which it is plunged; the solid being borne up by the fluid in a proportion equal to its respective gravity.

Thus, suppose the glass solid to weigh in air 1464 grains, and that, when it is suspended from the water-scale and immersed in water, it loses of its weight 445 grains; this would be the weight of a bulk of water equal to the solid. The balance-weight for the solid must be made just equal to what it weighs in water, *i. e.* 1019 grains.

Whatever fluid is to be weighed, let it be put into the glass recipient; suspend the solid to the hook of the water-scale, and let it hang freely in the liquor, putting the balance-weight in the opposite scale. If the fluid be heavier than water, the solid will rise in it; if lighter, it will sink to the bottom of the recipient. In either case small weights are to be put into the lighter scale, till the balance be made even.

1. When the fluid is *lighter* than water, the weight *gained* by the glass solid is to be *subtracted* from the weight of a bulk of water equal to the solid [445], and the remainder is the weight of an equal bulk of the fluid, or its specific gravity to water.

Example 1. When such a glass solid as the above was immersed in *brandy*, it balanced 38.2 grains more than in water. This, taken from 445.0, leaves 406.8; therefore the specific weight of the brandy was to water as 406.8 to 445. To reduce it to its proper terms, multiply the difference [38.2] by 1000, (the denominator of water) and divide the product by 445. As $445 : 38.2 :: 1000 : 86$; subtract 86 from 1000, there remain .914, the specific gravity of the brandy. From hence it appears, that the brandy weighed 86 parts in 1000, or about $\frac{1}{12}$ th less than water.

Example 2. In *rum* the solid balanced 40.3 grains more than in water; as $445 : 40.3 :: 1000 : 91$ —91 from 1000, remain .909. The specific gravity of the rum to water was therefore .909, or about $\frac{1}{11}$ th.

Example 3. When the solid was immersed in highly rectified *spirit of wine*, it balanced 73.6 more than in water; therefore $445 : 73.6 :: 1000 : 165$ —165 from 1000, remain .835, or $\frac{1}{6}$ th.

It appears from these examples, that the *hydrostatic balance* is a certain and correct instrument for determining the *strength of spirits*, perhaps more so than the most accurate *hydrometer* that has yet been made for that purpose. It is of considerable consequence to distillers and dealers in spirituous liquors, to know the precise point of strength which is termed *proof*: though this indeed is rather arbitrary than any fixed standard; but the degree of strength which, I am informed, is now called *merchantable proof*, fixeth the specific gravity of the spirit to water at .930. Now 930 taken from 1000 leaves 70; therefore $1000 : 70 :: 445 : 31.15$. So that in *proof spirit*, a glass solid of the weight above mentioned must balance 31.15, or about $3\frac{1}{4}$ grains more than in water.

It may easily be found in what proportion the spirit is *above* or *below* proof, by observing what quantity of *water* or *alcohol* is necessary to be mixed with it, in order to bring it to the above standard; and it might be immediately known, by comparing the weight of the spirit with that of water, if the specific gravity of both, when compounded, remained in the same ratio as when separate; but as it is found that, when water is mixed with spirit, the specific gravity of the compound is *greater* than that of the water and the spirit before they are compounded, the calculation must therefore turn out incorrect. For instance, a quantity of the *rum* before mentioned, equal in bulk to the glass solid, weighed very nearly 405 grains; an equal bulk of water 445 grains: suppose then, that in order to reduce the

rum to *proof*, one *fifth* part of water was to be mixed with it;

Water	-	1	=	445
Rum	-	4	=	1620
		5)	2065

Mean weight = 413

By this it appears, that a quantity of the compound, equal in bulk to the glass solid, should weigh 413 grains, and consequently that the solid, when immersed in it, should balance 32 grains more than in water; in which case it would still be somewhat above proof. But upon trial, it will be found to balance not much more than $29\frac{1}{2}$, and that there must be but little more than *one-seventh* part of water mixed with the rum to reduce it to the given standard.

Immediately after water is mixed with spirit, the compound appears *lighter*; but in a few hours afterwards, when the particles of each are more intimately united, its bulk diminishes, and consequently the specific gravity increases.

From a few experiments of this kind, the theory will appear sufficiently plain; and a table might easily be formed for shewing by inspection what quantity of water is necessary to be put to any given quantity of spirit to render it true proof.

2. When fluids are specifically *heavier* than water, the glass solid, as before observed, will *rise* in such fluid (the water balance-weight being in the opposite scale), and appear to be lighter: small weights are therefore to be put in the water-scale, till the equilibrium be restored; and the *loss* which the solid sustains, by being weighed in the heavy fluid, is to be *added* to the weight of a bulk of water equal to the solid: the sum shews the specific gravity of the fluid to water.

Example 4. Suppose it was required to find the specific gravity of *sea-water*, or how much heavier it is than rain-water. Let the solid be suspended as usual to the water-scale, and immersed in the sea-water, putting the balance-weight in the opposite scale. It will require 11.6 grains to bring it to an even balance. As $445 : 11.6 :: 1000 : 26$. The specific gravity is therefore 1026; which shews that sea-water is 26 parts in 1000, or $\frac{1}{38}$ th heavier than rain-water; or that there must be 1026 measures of rain-water to weigh as much as 1000 measures of sea-water. The method is the same for every other fluid specifically heavier than water.

The specific gravity of *salt* and *water*, in equal quantities, (in measure) is 1205; or about one-fifth heavier than common water is found to be.

SECT. X. Of measuring the Specific Gravity of a Fluid by the Hydrometer.

If there are several fluids to be compared, and a given body which is specifically lighter than any of them is made to float upon their surface, the parts of the body that sink below the surface in these different fluids will be inversely as their specific gravities.—A piece of cork will sink deeper in spirits of wine than in water; and the part of it which sinks below the surface of the spirits will be to the part which sinks below the surface of the water as the specific gravity of the spirits is to that of the water when they are inverted, that is, as the specific gravity of the water is to that of the spirits. The part which sinks below the surface in the spirits, is the bulk of as much spirits as is equal in weight to the whole cork; and the part which sinks below the surface of the water, is the bulk of as much water as is equal in weight to the same cork. These parts are therefore to each other as the bulks of equal weights of spirits and water; but these bulks, and consequently the parts of the cork that sink below the surface, are inversely as the specific gravities of spirits and water.

Hence we can discover the specific gravity of different solids, by plunging them in the same fluid; so we can discover the specific gravity of different fluids, by plunging the same solid body into them; for, in proportion as the fluid is light, so much will it diminish the weight of the body weighed in it. Thus, we know that spirit of wine has less specific gravity than water, because a solid that will swim in water will sink in spirits of wine. The stronger any fluid is, the greater will be its resistance to any solid immersed; spirit of nitre has greater specific gravity than water; and a solid that will sink in water will swim in spirit of wine. The method of comparing fluids with each other by means of the hydrometer or aerometer depends on this principle. See the article *HYDROMETER*.

The *hydrometer* is indeed one of the most useful philosophical instruments; for, though the hydrostatic balance be the most general instrument for finding the specific gravities of all sorts of substances, yet the hydrometer is better to discover with ease and expedition those of fluids. It consists of four parts: 1. A ball of metal, ivory, or glass. 2. A tail and weight to poise the instrument, that a certain part of the instrument may be always downmost in the liquor. 3. A long stem arising from the opposite and upper part of the instrument. 4. A shoulder on the upper part of this instrument, for occasionally placing of weights to cause the instrument to sink so far that the surface of the fluid may always cut the stem at a particular point. When this instrument is swimming in the fluid, the part of the fluid displaced by it will be equal in bulk to the part of the instrument under water, and equal in weight to the whole instrument.

Let us suppose the weight of the whole to be 4000 grains. It is evident we can by this instrument compare together the different bulks of 4000 grains of various fluids: for instance, if the weight at bottom be such as shall cause the hydrometer to sink in rain water till its surface come to the middle point of the stem; and if after this it be immersed in common spring water, and the surface thereof is one tenth of an inch below the middle point, it is evident that the same weight of each water differs in bulk only by the magnitude of one-tenth of an inch in the stem.

Now, suppose for ease in calculation the stem were ten inches long, and weighed 100 grains, then every tenth of an inch would be one grain weight; and since the stem is of brass, and brass is about eight times heavier than water, the same bulk of water will be equal to one-eighth of a grain, and consequently to one-eighth of $\frac{1}{80}$ th part of the whole, that is, a 320,000th part of the whole bulk.

Hydrometers of various kinds have been constructed for the purpose of ascertaining the strength of spirits; but as Government, to avoid disputes respecting the duties, have passed an act to constitute *Clark's* hydrometer (for a short time) the only legal one, it will be unnecessary to describe the various constructions that have been made. Mr. Ramsden, in an excellent paper on this subject, has shewn, that to answer these valuable purposes, four points must be well ascertained. 1. A method of proportioning and expressing in measures the quantities of spirits in compounds, and of determining their specific gravities. 2. A means of ascertaining the increase or diminution in the bulk of a given compound arising from different degrees of temperature. 3. The application of the experiments under the two preceding heads to the construction of an hydrometer, which shall give the specific gravity of any compound in thousandth parts of that of distilled water; and at the same time the quantity of spirits of a given strength in the compound in hundredth parts of the volume. 4. A method to determine the proportion of spirits to water in the compound, now called *proof*, which the commissioners of the customs have stated to weigh seven pounds twelve ounces per gallon, at the temperature of 55 degrees; for which purpose it is necessary to have an exact gallon measure.

See Ramsden's Account of Experiments to determine the specific Gravities of Fluids. De Luc on Pyrometry, Aerometry, &c. Philos. Transf.

Hence it should seem, that the determining the specific gravities of fluids, in order thereby to obtain accurately the strength of spirituous liquors, is a very complicated problem. Mr. De Luc has shewn, that when an hydrometer is employed, there are three physical effects, the degrees of which are not proportionate to their apparent causes, and which are united in one effect, namely, the different sinking of the hydrometer. 1. It will not always sink in liquors of different densities proportionally to these densities, on account of the changes of its own bulk by heat, and the possible irregularities of its branch. 2. It will not sink in proportion to the changes of temperature of the fluid, because the changes of density in the latter do not follow the same law as the changes of temperature. 3. It will not sink exactly in the inverse ratio of the quantities of phlegm, because the specific gravity of the fluid does not follow the proportion of these quantities. It has an increasing progression; and here the intermediate cause of this disproportion, which is evident, may give you an idea of what takes place in nature, and hinders physical effects from appearing proportional to their causes.

The spirit and the phlegm penetrate each other, that is to say, 'the bulk of the mixture is somewhat less than the sum of the two bulks before the mixture;' and thus the specific gravity, which is the weight under a certain bulk, increases but little in the mixture comparatively with the mean specific gravity of the component parts. In order therefore to have equal degrees in the hydrometer, without sensible error in the spirituousity that it is intended to measure, it is necessary to fix these degrees by the comparison of effects observed within the limits of the common observations.

SECT. XI. *Of a Phenomenon not to be accounted for on the general Doctrine of Specific Gravity.*

BODIES of the greatest known specific gravity, when divided into very minute parts by the menstrua in which they are dissolved, will remain suspended therein for any length of time: thus, *aqua regia*, or even *ether*, holds suspended the parts of that most ponderous of all metals, gold. Some mathematicians endeavour to account for this part of the phenomenon; but there is another difficulty, which will not bend to theory. It does not follow from any established principles, how a body divided into parts, however minute, can possibly *ascend* in a fluid specifically lighter than itself; whereas it is well known, that in some solutions, when the solid to be dissolved is placed at the bottom of a vessel into which the dissolving fluid is poured, the parts of the solid during the solution, *without any motion* whatever being communicated to the vessel, will be diffused throughout the substance of the dissolving fluid, appearing to overcome the natural tendency of bodies towards the centre of the earth, and to have some new power of ascent impressed upon its particles. See Atwood's Treatise on Rectilinear Motion, pages 155, 162, &c.

SECT. XII. *Different Methods of ascertaining the Specific Gravity of Fluids.*

IN the following way the specific gravities of water and any other fluid may be compared together. Weigh very accurately an ounce or other weight of distilled water in a cylindrical glass phial, and mark precisely the space occupied by it; then pour in any other fluid till it fill exactly the same space with the water, and weighing it you will know the weights of equal magnitudes of the water and the other fluid, and their specific gravities.

The magnitude of a body, however irregular, may be found by immersing it in a cylindrical vessel of water, and marking

how far the fluid rises; for the space contained between the surfaces of the water before and after the immersion of the body, is equal to its magnitude; and this, together with its weight, being known, its specific gravity is also known.

The capacity of any irregular vessel may be known by filling it with water; for the water being weighed, its magnitude or the number of cubical inches contained in it will be found. Let the vessel be filled with water, and let the weight of the water be A ounces; then make the following proportion: As 52.46 to A, so is 1 to the capacity of the vessel expressed in cubic inches; this will be facilitated by the following table:

oz.	cubic inches.
1 —	1.8959
2 —	3.7918
3 —	5.6877
4 —	7.5835
5 —	9.4794
6 —	11.3753
7 —	13.2712
18 —	15.1671
19 —	17.0630

To exemplify the use of this table, suppose the water contained in a receiver of an air-pump or other vessel to weigh 235.18 oz. then referring to the table,

oz.	cubic inches:
200	= 379.18
30	= 56.88
5	= 9.48
.1	= .19
.08	= .15

445.88 the number of cubic

inches contained in the vessel.

If avoirdupois ounces are used in weighing the water, the numbers may be taken from the above table; but the resulting number must be multiplied into 9145, to give the true number of cubic inches contained in the vessel.

SECT. XIII. Table of Specific Gravities.

Refined gold	- -	19.640	Selenites	- -	2.252
English guinea	- -	18.888	Sal gemmæ	- -	2.143
Mercury	- -	14.019	Brick	- -	2.000
Lead	- -	11.344	Nitre	- -	1.900
Refined silver	- -	11.091	Alabaster	- -	1.875
Bismuth	- -	9.700	Dry ivory	- -	1.825
Copper from Japan	- -	9.000	Brimstone	- -	1.800
Copper from Sweden	- -	8.843	Dantzick vitriol	- -	1.715
Hammered brass	- -	8.349	Alum	- -	1.714
Cast brass	- -	8.100	Borax	- -	1.714
Turbith mineral	- -	8.235	Human calculus	- -	1.700
Cinnabar, factitious	- -	8.200	Oil of vitriol	- -	1.700
Cinnabar, natural	- -	7.300	Oil of tartar	- -	1.550
Elastic steel	- -	7.820	Bezoar	- -	1.500
Soft steel	- -	7.738	Honey	- -	1.450
Iron	- -	7.645	Gum arabic	- -	1.375
Pure tin	- -	7.471	Spirit of nitre	- -	1.315
Glass of antimony	- -	5.280	Aqua fortis	- -	1.300
A pseudo topaz	- -	4.270	Pitch	- -	1.150
A diamond	- -	3.400	Spirit of salt	- -	1.130
Crystal glass	- -	3.150	Human blood	- -	1.126
Island crystal	- -	2.720	Spirit of urine	- -	1.120
Rock crystal	- -	2.650	Human blood	- -	1.054
Common glass	- -	2.620	Amber	- -	1.040
Fine marble	- -	2.704	Serum of human blood	- -	1.030
Stone of a mean gravity	- -	2.500	Milk	- -	1.030

Urine	- -	1.030	Spirit of turpentine	- -	0.874
Dry box-wood	- -	1.030	Rect. spirit of wine	- -	0.865
Sea-water	- -	1.030	Dry ash	- -	0.800
Common-water	- -	1.000	Dry maple	- -	0.755
Camphire	- -	0.996	Dry elm	- -	0.600
Bees wax	- -	0.955	Dry fir	- -	0.550
Linsced oil	- -	0.932	Cork	- -	0.240
Dry oak	- -	0.925	Air	- -	0.005
Oil, olive	- -	0.913			

This table exhibits the specific weights of the various substances contained in it, discovered by some of the methods already described; and the absolute weight of a cubic foot of each body is ascertained in avoirdupois ounces by multiplying the number opposite to it into 1000; as, for example, S. g. of water: S. g. of mercury :: 1 : 14.019 :: 1000 oz. : wt. of a cubical foot of mercury, which is therefore equal to 1000 × 14.109 avoirdupois ounces. There are some uncertainties in this subject; for substances of the same kind, though denominated by the same name, may not be precisely similar, and some small errors may perhaps be inevitable in physical experiments; but they will be inconsiderable if the scales be nicely adjusted, and the experiments cautiously conducted, so that the body weighed do not touch the bottom or sides of the vessel, nor rise above the surface of the fluid, nor bubbles of air adhere to its surface. There is another cause of uncertainty; for most substances are dilated by heat and contracted by cold, and the dimensions of the same body, and consequently its specific gravity, are different according to the different temperatures of the ambient air; and the altitude of the thermometer ought to be considered in constructing a table of specific gravities. The different expansion of bodies in summer and winter, and consequently their different specific gravities, appear from the experiments of Homberg, and Eilenschmedites in his "Disquisition nova de Ponderibus, &c." from the latter of whom the following table, exhibiting the weight of a cubical inch, Paris measure, of different substances, is taken.

A cubic inch,	In summer.	In winter.
Paris Measure.	oz. dr. gr.	oz. dr. gr.
Of mercury	7 1 66	7 2 14
Oil of vitriol	7 59	7 71
Spirit of vitriol	5 33	5 38
Spirit of nitre	6 24	6 44
Spirit of salt	5 49	5 55
Aqua fortis	6 23	6 35
Vinegar	5 15	5 21
Distilled vinegar	5 11	5 15
Burgundy wine	4 67	4 75
Spirit of wine	4 32	4 42
Pale ale	5 1	5 9
Brown ale	5 2	5 7
Cow's milk	5 20	5 25
Goat's milk	5 24	5 28
Urine	5 14	5 19
Spirit of urine	5 45	5 53
Spirit of tartar	7 27	7 43
Oil of olives	4 53	frozen
Oil of turpentine	4 39	4 46
Sea water	6 12	6 18
River water	5 10	5 13
Spring water	5 11	5 14
Distilled water	5 8	5 11

It appears from this table, that the expansions of different fluids are different in the same changes of the temperature of

the air; and it appears from observation, that substances not fluid are also in similar circumstances differently dilated; but the weight of given magnitudes, both of fluid and firm bodies, being diminished by heat, and increased by cold, the variation

of their specific gravities is less than if the dimensions of one of them only had been variable.

Having brought this part of our subject to a conclusion, we shall now proceed to speak of Hydraulics.

PART II. H Y D R A U L I C S.

SECT. I. *Of the Motion of Fluids.*

IN the foregoing pages we have shewn that by *hydrostatics* we are taught to determine the weight or pressure of fluids upon solids, or upon each other, in vessels where the water is not suffered to escape, but remains at rest. *Hydraulics* has for its object the *motion of fluids*: and upon the principles of this science many machines are constructed: several engines used in the mechanic arts, and various kinds of mills, pumps, and fountains, are the result of hydraulics judiciously applied.

Could we know with certainty the mass, the figure, and the number of particles of a fluid in motion, the laws of its motion might be determined by the resolution of a mathematical problem, namely, by finding the motion of a system of small free bodies acting one on the other in obedience to some exterior force, as that of gravity. We are, however, very far from being in possession of the data requisite for the solution of this problem: even if we were in possession of them, it is doubtful whether we should be much farther advanced, as it would be difficult to deduce any satisfactory results from the intricate calculations in which the question would be involved. Some great mathematicians have endeavoured to deduce the laws of motion in fluids from the equilibrium of their particles, but unfortunately they are so complicated as to be of no practical use.

Accurate physical principles are always necessary before any utility can be drawn from mathematical abilities. Men may enter deeply into abstract speculations, and rise from assumed data to the most sublime efforts of the human mind; but if no physical existences correspond with those data, no advantage can arise to the general state of knowledge from exercises of this kind, and they can only be considered as mere amusements of the understanding. It will be therefore necessary for those who wish to investigate this subject, to endeavour to establish their physical principles on experimental facts, and accurate observation. For what we have to observe on this subject, we are chiefly indebted to the Abbé Bossut.

SECT. II. *Of the Spouting of Fluids through small Orifices.*

WHEN water is ejected from a small hole in the bottom of a vessel, 1. The water descends nearly in a vertical direction, and the surface deviates very little from a horizontal plane; but at about three or four inches from the bottom the particles turn from the vertical direction, and come from all parts with a motion more or less oblique towards the aperture. The same thing takes place when the water escapes from a small hole in the side of the vessel. The tendency of the particles towards the orifice is a necessary consequence of their perfect mobility; for they are hereby naturally directed towards that part where they meet with the least resistance, which part is the aperture. 2. At a small distance from the bottom of the vessel the water forms itself into a kind of funnel, whose point or

summit corresponds with the centre of the hole. When the water runs out of a hole in the side of the vessel, it forms only a kind of half funnel, beginning when the surface nearly touches the upper edge of the hole. It is probable that the funnel begins to be formed as soon as the water begins to run out; but it does not become very sensible, except when the surface is at a small distance from the bottom*. The funnel commences at a greater height from the bottom of the vessel, in proportion as the bottom is larger; the size thereof is, however, varied by a number of circumstances.

The *velocity* of the water spouting from a small hole in the bottom of the vessel, is equal to that which a heavy body would acquire in falling vertically from a height equal to that of the surface of the fluid above the aperture. The same law takes place when the hole is in the side of the vessel; for the pressure of the fluid is equal (at the same depth) in all directions, and will consequently produce the same velocity. The fluid in issuing out of the hole gives a velocity sufficient to make it rise vertically to a height equal to that of the surface of the fluid above the aperture; in the same manner as a body falling from a certain height acquires a velocity sufficient to make it ascend to the height from which it fell.

From the theory of falling bodies, it is plain, that if the fluid continued to move uniformly with the velocity it had acquired at coming out of the hole, it would move through a space equal to double the height of the fluid above the aperture, while a heavy body was descending through the same space. The height being the same, the velocity of the fluid at the aperture will be always the same, and this though the fluid varies in density; for though with a denser fluid the pressure is greater, the mass escaping is also greater, and the velocities are equal when the moving forces are proportioned to the masses they put in motion.

The *quantities* of a fluid proceeding in the same time through different apertures, each acted upon by a constant height or load (supposing of course that the vessels are kept equally full during the whole experiment), are to each other as the *product of the areas of the apertures by the square root of the heights*. For example, it has been proved by experiment, that a circular aperture of 1 inch diameter, in a thin vessel, gives in one minute of time, the water being four feet high, 5436 cubic inches of water. To know what will be furnished in the same time by an aperture two inches in diameter, the altitude of the water nine feet (French measure), use the following proportion (observing that the aperture of two inches is four times as large as that of one, because the areas of circles are as the squares of the diameters): As $1 \times \sqrt{4}$ is to $4 \times \sqrt{9}$, so is 5436 to x : or, as 2 is to 12, so is 5436 to 32616 cubic inches of water, the quantity that will be furnished by an aperture of two inches diameter from a reservoir whose surface is always kept at nine feet from the aperture.

* The writers on this subject (says Mr. George Adams) seem to have neglected a revolving motion in the water, but which on making further experiments they will find worthy their attention. "If at the bottom of a vessel of water an aperture be made for the fluid to escape, it will revolve about the aperture, and at some distance from it, and escape with this revolving motion; the water rushes from all sides in concentrating streams to supply the continual waste."

If you fill with water a prismatic vessel, and let the water run out by an aperture in the bottom, observing the time employed by the water in running out; and then fill the vessel again, keeping the surface of the water at the same height; you will find in this last case, that in the same interval of time that the vessel was emptying itself in the first instance, nearly double the quantity of water has been expended in the second.

In practice the water often issues from lateral openings, which, although but small in comparison with the size of the reservoirs, cannot be considered as having all their points at an equal distance from the surface of the fluid. In these cases, the usual method of determining the quantity of water flowing through the aperture depends on the following principles: Imagine the whole to be stopped by a plate, and this plate to be pierced with a great number of holes through which the water escapes; now, considering each of these holes as a single insulated aperture, the velocity for each will be according to the correspondent height of the fluid. If the number of these holes be infinitely augmented, or, what comes to the same thing, if the plate be taken away, the velocity of each point of the given aperture will be as the height corresponding thereto; and in determining the quantity of effluent water, regard must be had to this inequality of velocity.

It should not however be concealed, that this mode of reasoning is not very conclusive; for though it may be just as far as relates to the number of insulated holes, it does not appear clearly that the water will flow exactly in the same manner when the threads thereof are united, as when they proceed from small separate apertures: as the results of theory, however, upon this plan do not differ much from experiments, it may be useful to preserve it till some better method is discovered.

The quantity of water flowing through holes in a given time is not so great as might have been naturally expected, because the water does not flow in a compact parallel stream, but *contracts* in diameter on coming out of the aperture, and this contraction extends to a distance nearly equal to half the diameter of the aperture. The diameter of the *contracted stream* is to the diameter of the aperture as 3 to 4, or as $3\frac{1}{2}$ to 4, or as 19 to 24, so that its area to that of the aperture is as 10 to 16: it is nearly the same thing when the water flows from lateral apertures.

This contracted stream is a proof that within the vessel the lateral particles are directed towards the hole, with different degrees of obliquity, which obliquity may be decomposed into two forces, one parallel to the plane of the hole, which contracts the fluid; the other perpendicular to the same plane, which occasions the efflux. This contraction takes place also when water passes through tubes, and the contraction is at the entrance of the water into the tube, not at its going out, where it preserves its cylindric form. This contraction diminishes sensibly the quantity of water that should be furnished by the tubes. To ascertain these facts, M. Bossut made a great number of experiments, the results of which we shall here set forth. The apertures for the efflux of the water were all pierced perpendicularly in plates about $\frac{1}{2}$ a line thick, and the time of each experiment is reduced to 1 minute.

The water was kept constantly at eleven feet eight inches ten lines from the centre of each aperture.	Number of cubic inches furnished in one minute.
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Exp.		
1.	With an horizontal circular aperture, 6 lines diameter	2311
2.	With a circular horizontal aperture, 1 inch diameter	9281

The water was kept constantly at eleven feet eight inches ten lines from the centre of each aperture.	Number of cubic inches furnished in one minute.
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Exp.		
3.	With a circular horizontal aperture, 2 inches diameter	37203
4.	With a rectangular horizontal aperture, 1 inch by 3 lines	2933
5.	With a square horizontal aperture, the side 1 inch	11817
6.	By a square horizontal aperture, the sides 2 inches	47361

Constant Height 9 Feet.

7.	Lateral circular aperture, 6 lines diameter	2018
8.	Lateral circular aperture, 1 inch diameter	8135

Constant Height 4 Feet.

9.	Lateral circular aperture, 6 lines diameter	1353
10.	Lateral circular aperture, 1 inch diameter	5436

Constant Height 7 Lines.

11.	By a lateral and circular orifice, 1 inch diameter	628
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From the preceding Experiments we make the following deductions:

1. 'The quantities of fluid discharged in equal times from different sized apertures, the altitude of the fluids being the same, are nearly to each other as the areas of the apertures.' Thus in the second and third experiments the areas of the apertures are as one to four, and the water discharged 9281 cubic inches; 37203 is nearly in the same ratio.

2. 'The quantities of water discharged, in equal times, by the same aperture, with different altitudes of the reservoir, are nearly as the square roots of the corresponding altitude of the water in the reservoir above the centre of the aperture.' Compare together the eighth and tenth experiments, in which the respective altitudes of the reservoir were of 9 and 4 feet, of which the square roots are 3 and 2, and we find the water discharged by the first was 8135 cubic inches, the second 5436 cubic inches; nearly in the proportion of 3 to 2.

3. 'That in general, the quantities of water discharged in the same time, by different apertures and under unequal altitudes of the reservoirs, are to each other in a compound ratio of the areas of the apertures and the square roots of the altitudes.'

4. 'That on account of the friction, the smallest apertures discharge less water than those that are larger and of a similar figure, the water in the respective reservoirs being at the same height.'

5. 'That of several apertures whose areas are equal, that which has the smallest circumference will discharge more water than the others, the water in the reservoirs being at the same altitude,' and this because there is less friction. Hence circular apertures are most advantageous, as they have less rubbing surface under the same area.

It is easy to perceive, that the quantities of water expended in the foregoing experiments are not nearly so much as they ought to be, considering the size of the apertures and the altitude of the reservoirs. The quantity discharged is diminished considerably by the friction, and by the contraction of the stream; and

probably on account also of the circular motion of the fluid: for the velocity which depends on the altitude of the reservoir is not sensibly altered. The difference in the discharge of water, supposing, 1. that the area of the stream is the same with that of the aperture; 2. that this stream is contracted, is as 16 to 10: in other words, by supposing the area of the orifice to be diminished in the proportion of 16 to 10, you may determine with sufficient exactness the efflux of fluids from vessels where the surfaces are maintained at the same height.

SECT. III. Of the Discharge of Fluids through additional Tubes.

If the water, instead of flowing through an aperture pierced in a thin substance, passes through the end of a vertical tube of the same diameter as the aperture, there is a much greater discharge of water, because the contracted stream is greater in the first instance than in the second. In the following experiments the constant height of the water in the reservoir above the upper aperture of the tube was 11 feet 8 inches 10 lines, the diameter of the tube 1 inch.

Different lengths of the tube expressed in lines.		Number of cubic inc. of water discharged in 1 minute.	
Exp. 1	48	The stream filling the tube	12274
2	24		12188
3	18		12168
4	18	The water not filling the tube	9282

It appears on comparing the three first experiments, that the longer the vertical tube is, the greater is the discharge of the water, because the contraction of the stream is less; it is, however, always somewhat contracted, even when it appears to fill the tube.

By comparing the quantities of water discharged in the third and fourth experiments, we find the two discharges 12168, 9282, are to each other nearly in the proportion of 13 to 10; but we have seen, that the water discharged through a thin aperture without any contraction in the stream, would be to the same aperture with a contracted stream as 16 to 10. From hence we may conclude, that the altitude in the reservoir and the apertures being the same, the discharge through a thin aperture without any contraction in the stream, the discharge through an additional tube, and the discharge through a similar aperture with a contracted stream, are to each other nearly as the numbers 16, 13, 10; these proportions are sufficiently exact for practice. Hence it is plain that an additional tube only destroys in part the contraction of the stream, which contraction is greatest when the water passes through a thin aperture from a large reservoir.

If the additional tube, instead of being vertical, or placed at the bottom of the reservoir, was horizontal or placed in the side, it would furnish the same quantity of water, provided it was of the same length, and that the exterior aperture was at the same distance from the surface of the water in the reservoir.

If the additional tube instead of being cylindrical was conical, having its largest base nearest the reservoir, it would discharge a greater quantity of water. The most advantageous form that can be given, in order to obtain the greatest quantity of water in a given time by a given aperture, is that which the stream assumes in coming out of the aperture; i. e. the tube must be of the form of a truncated cone, whose smallest base should be of the same diameter as the aperture; the area of the small base

should be to that of the larger base as 10 to 16; and the distance from one base to the other should be the semidiameter of the largest base; and the efflux of water will be as abundant as it would be through a thin aperture equal to the smallest base, and where the stream was not contracted. This form may be applied where it is necessary to obtain a certain quantity of water from a river, an aqueduct, &c. by a canal or lateral tube.

On comparing the efflux of water through additional tubes of different diameters, and with different altitudes of the water in the reservoirs, the following results were obtained; the additional tubes were two inches long, and were vertical and placed at the bottom of the reservoir.

Constant altitude of the water above the tubes.	Diameter of the tubes expressed in lines.	Number of cub. in. in 1 min.
Ex. 1 2 3 feet 10 inches	6 } Water filling the tube	1689
	10 } the tube	4703
	6 } The water not following the sides	1293
	10 }	3598
3 4 5 6 2 feet	6 } The water filling the tube	1222
	10 }	3402
	6 } The water not filling the tube	935
	10 }	2603
7 8		

It results from these experiments, 1. That the discharge by different additional tubes, with the same altitude of the reservoir, are nearly in proportion to the area of the apertures, or to the squares of the diameters. 2. That the discharge of water by additional tubes of the same diameter, with different altitudes of water in the reservoir, are nearly proportional to the square root of the altitude of the reservoir. 3. That in general the discharge of water in the same time, through different additional tubes, with different altitudes of water in the same reservoir, are to each other nearly as the product of the square of the diameters of the tubes by the square root of the altitude of the reservoirs. So that, additional tubes, transmitting water, follow (amongst themselves) the same laws as through the thin orifice. The following table was formed from the foregoing experiments.

Constant altitude of the water in the reserv. above the aperture expressed in feet.	Water discharged in one minute through an hole 1 inch diam. the stream not contracted. in cub. inc.	Water discharged in 1 minute through an additional tube of 1 inch diam. 2 inc. long, in cub. inc.	Water discharged during 1 minute through a hole 1 inch diam. with a contracted stream, in cub. inches.
1	4381	3539	2722
2	6169	5002	3846
3	7589	6126	4710
4	8763	7070	5436
5	9797	7900	6075
6	10732	8654	6654
7	11572	9340	7183
8	12392	9975	7672
9	13144	10579	8135
10	13855	11151	8574
11	14530	11693	8990
12	15180	12205	9384
13	15797	12699	9764
14	16393	13177	10130
15	16968	13640	10472

SECT. IV. *Of Fountains or Jets d'Eau.*

THE subject which we shall now proceed to consider, is the nature of *Fountains*. There are few things that give more pleasure to the eye than a diversity in the play of water from a fountain: but these machines give still greater pleasure in sultry climates, where they contribute to cool the air, as well as to enliven the prospect.

Whatever be the direction of the jet, the discharge of water is always the same; provided that the ajutage, and the altitude of the reservoir above the ajutage, be the same. This is a necessary consequence of the equal pressure of fluids in all directions. Water, spouting from a small ajutage, has sufficient velocity to carry it to the same height as the water in the reservoir; but it never attains entirely this height, being prevented by various concurring causes. 1. The friction in the tubes between the reservoir and the ajutage. 2. The friction against the circumference of the aperture. 3. The resistance of the air to the weight of the water at the top of the spout; for this, having lost its motion, rests on the part below, and by its weight obstructs the motion of the column. The resistance from this cause is so great, that the jet is frequently destroyed, the rising water being by fits and starts pressed down to the very orifice from which it spouts; but this inconvenience is remedied, if you give the jet a little inclination; for then the particles which have lost their motion upwards do not fall back as before, but fall off from the rest, and thus do not incumber the rising fluid; hence such jets as are a little inclined will rise higher than those that are vertical.

When the ajutage is inclined to the horizon, the projectile force and the gravity of the water cause the stream to describe a parabola, whose amplitude is greater in proportion to the height of the reservoir. When the ajutage is in an horizontal direction, the jet describes a semi-parabola.

Jets of water rise higher in proportion as the aperture of the ajutage is large; because, 1. Of two jets proceeding from the same reservoir with equal velocities, the largest undergoes less friction: 2. It has more mass, and consequently more force to overcome obstacles. But though a large jet will rise higher than a small one, it does not discharge more water; for the discharge is as the product of the aperture by the velocity at the moment of efflux; and this velocity is the same in each, friction not being considered.

In order to make large jets rise higher than small ones, the conduit-pipe must be large enough to furnish a sufficient quantity of water; for experience has shewn, that if these are narrow, small jets will rise higher than those that are larger. The diameter of the conduit-pipe should therefore bear a certain proportion to that of the ajutage, in order to make a jet rise to the greatest possible height. If we compare two different jets, and are desirous that each should attain its greatest altitude, the squares of the diameters of the conduit-pipes must be to each other in the compound ratio of the squares of the diameters of the ajutages, and the square root of the altitude of the reservoir. Thus, if we know by experience the diameter that ought to be given to a conduit-pipe, to furnish water for the discharge of a given ajutage, with a reservoir of a given altitude, we may determine the diameter of another tube, to feed a given ajutage with a reservoir of a given altitude.

Experience has shewn, that, for an ajutage six lines diameter, with a reservoir of fifty-two feet, the conduit-pipe should be about thirty-nine lines; for an ajutage six lines diameter, and a reservoir sixteen feet, the conduit-pipe twenty-eight lines and an half. There is no inconvenience in giving a conduit-pipe a greater diameter than is required by the above rule, but there would be a considerable one in giving it a smaller diameter.

From the comparison of several experiments made on jets

d'eau, it appears that the difference between the altitudes of vertical jets, and the altitudes of the reservoirs, is to each other as the squares of the jet's altitude. If we know, therefore, by experiment, how far any jet falls short of the altitude of its reservoir, you may find by the rule of three, how much any other jet falls short of its reservoir. If we wish to know the altitude of the reservoir, we have only to add to the altitude of the jet the quantity found by the proportion. It is to be observed, that conduit-pipes should never be fixed at right-angles to each other.

The following table will facilitate the application of the foregoing principles. In the two first columns are the altitudes of the jets, and the corresponding altitudes of the reservoir. The third column contains (in Paris pints, thirty-six of which make a cubic foot) the discharge during one minute, through an ajutage six lines diameter, relatively to the altitudes of the second column. Knowing the discharge with an ajutage of six lines by the rule of three, we discover the discharge by any other ajutage with a reservoir of the same height; since it has been proved, that the discharges are as the area of the ajutage, or as the squares of the diameters of these ajutages. In the fourth column appear the diameters for the conduit-pipes of an ajutage six lines diameter, relatively to the altitudes of the second column.

Altitude of the jet in feet.	Altitude of the reservoir in feet and inches.	Discharge in minute by an ajutage of 6 lines diam. in Paris pints.	Diam. of the conduit pipes relative to the 2d and 3d cols.
	Feet. In.	Pints.	Lines.
5	5 1	32	21
10	10 4	45	26
15	15 9	56	28
20	21 4	65	31
25	27 1	73	33
30	33 0	81	34
35	39 1	88	36
40	45 4	95	37
45	51 9	101	38
50	58 4	108	39
55	65 1	114	40
60	72 0	120	41
65	79 1	125	42
70	86 4	131	43
75	91 9	136	44
80	101 4	142	45
85	109 1	147	49
90	117 0	152	47
95	125 1	158	43
100	133 4	163	49

The application of these principles has supplied an infinite variety of amusing contrivances. We shall here produce one instance in what is called the *Circulating Fountain*. See plate 20.

In this fountain, the air being compressed by the concealed fall of water, makes a jet, which, after some continuance, is considered by the ignorant as a perpetual motion; because they imagine that the same water which fell from the jet rises again. The boxes CE and DYX being close, we see only the basin ABW, with a hole at W, into which the water spouting at B falls; but that water does not come up again; for it runs down through the pipe WX into the box DYX, from whence it drives out the air through the ascending pipe YZ, into the cavity of the box CE, where, pressing upon the water that is in it, it forces it out through the spouting pipe OB, as long as there is any water in CE; so that this whole play is only whilst the

water contained in CE, having spouted out, falls down through the pipe WX into the cavity DYX. The force of the jet is proportionable to the height of the pipe WX, or of the boxes CE and DY above one another: the height of the water, measured from the basin ABW to the surface of the water in the lower box DYX, is always equal to the height measured from the top of the jet to the surface of the water in the middle cavity at CE. Now, since the surface CE is always falling, and the water in DY always rising, the height of the jet must continually decrease, till it is shorter by the height of the depth of the cavity CE, which is emptying, added to the depth of the cavity DY, which is always filling; and when the jet is fallen so low, it immediately ceases. The air is represented by the points in this figure. To prepare this fountain for playing, which should be done unobserved, pour in water at W, till the cavity DXY is filled; then invert the fountain, and the water will run from the cavity DXY into the cavity CE, which may be known to be full when the water runs out at B held down. Set the fountain up again, and, in order to make it play, pour in about a pint of water into the basin ABW; and as soon as it has filled the pipe WX, it will begin to play, and continue as long as there is any water in CE. You may then pour back the water left in the basin ABW, into any vessel, and invert the fountain, which, being set upright again, will be made to play, by putting back the water poured out into ABW; and so on as often as you please.

SECT. V. Of Pumps.

WHAT has been said concerning conduit-pipes, the efflux of water from different apertures, &c. naturally leads us to consider the nature and action of pumps. Their general principles will be explained under the articles PNEUMATICS and PUMP. We shall here notice the different kinds, and remark some varieties in their construction.

Among the most valuable mechanical inventions of this sort is what is called the *chain-pump*. This is generally made from twelve to twenty-four feet in length; consists of two collateral square barrels, and a chain of pistons of the same form, fixed at proper distances thereon. The chain is moved round a coarse kind of wheel-work, fixed at one end of the machine. The teeth of this are so contrived as to receive one half of the flat pistons, and let them fold in, and they take hold of the links as they rise. A whole row of the pistons (which go free of the sides of the barrel by near a quarter of an inch) are always lifting when the pump is at work; and as this machine is generally worked with briskness, they bring up a full bore of water in the pump. It is wrought either by one or two handles, according to the labour required.

The chain-pump is so contrived, that, by the continual folding in of the pistons, stones, dirt, and whatever may happen to come in the way, may also be cleared: it is therefore used to drain ponds, sewers, and remove foul water, in which no other pump could be employed.

A section of this machine, as fixed in a frigate of war, is exhibited in plate 20, where A is the keel, V the floor-timber, X the kelson, a, a, a the several links of the chain, b b the valves, C the upper wheels, D the lower wheels, c c the cavities upon the surface of the wheels to receive the valves, as they pass round thereon, d d the bolts fixed across the surface of the wheels, to fall in the interval between every two links, to prevent the chain from sliding back.

SECT. VI. Of Pumps which act by the Pressure of the Atmosphere.

PUMPS of this description are pneumatic as well as hydraulic engines, and are usually divided into two kinds: 1. the common, or *sucking pump*; 2. the *forcing pump*. The nature of

these, their action and operation, are best explained by glass models; in which the motion of the pistons and the play of the valves may be distinctly seen.

Common Pump, (fig. 1, pl. 19).—By pouring water into a tub or trough, we may represent the well from which water is to be raised. There are two valves in this pump: one (b) at the upper end of the small tube; the other (a) on the moveable piston.

When the pump is not worked, their weight makes them lie close upon the holes over which they are placed. We raise or depress the piston, by means of the piston-rod, which is connected with the pump-handle. The piston being placed at the bottom of the barrel, before we begin to work, we should raise the piston from the bottom to the top of the barrel; which makes room for the air in the pump, below the piston, to expand itself. The air in the pipe being thus dilated, presses less on the surface of the water within the pipe, than the atmosphere does without on that in the trough; and consequently the water rises in the tube till the pressures are equal; that is, till the air within is just as dense as that without; and it will there remain at rest between the two equal pressures. The valve at the bottom, which rose a little to let some of the rarefied air into the barrel, falls down again, and closes the hole at the top of the pipe.

We now depress the piston; and as the air in the barrel cannot get back again through the valve b, at the top of the pipe, it will raise the valve in the piston, and so make its way through the upper part of the barrel into the open air. Upon raising the piston again, the air between it and the water in the lower pipe will again be left at liberty to fill a larger space; and so its spring being again weakened, the pressure of the atmosphere will force more water into the pipe; and when the piston is at the top of the barrel, the lower valve falls, and stops the hole at the top of the pipe, as before. The same effect is produced by every stroke, till at last the water in the pipe reaches the bottom of the barrel. Now, upon depressing the piston, as the water cannot be forced back again through the lower valve, it will raise the upper valve as the piston descends, and will be lifted up by the piston when raised again.

The whole space below the piston being now full of water, as the water cannot escape by the lower valve, it will, on depressing the piston, raise the valve, in order to let the piston down. When this is quite at the bottom, the valve will fall by its own weight, and stop the hole in the piston. When the piston is next raised, all the water above it will be lifted up, and run out of the spout; and thus, by alternately raising and depressing the piston still more water will be raised; which, getting above the pipe into the wide part at top, will supply the spout, and make it run with a continual stream. Thus, every time the piston is elevated, the lower valve *rises*, and the upper valve falls; but every time we *depress* the piston, the lower valve *falls*, and the upper one *rises*.

Now, as it is the pressure of the air of the atmosphere which causes the water to rise, and follow the piston, as it is drawn up; and as a column of water, of thirty-three feet high, is of equal weight with as thick a column of air, from the earth to the very top of the atmosphere; therefore the perpendicular height of the piston from the surface of the water in the well must always be less than thirty-three feet, otherwise the water will never rise above the piston. But when the height is less, the pressure of the atmosphere will be greater than the weight of the water in the pump, and will therefore raise it above the piston; and when the water has once got above the piston, it may be thereby lifted to any height, if the rod be made long enough, and a sufficient degree of strength be employed to raise it with the weight of water above the piston.

The force required to work a pump is as the altitude of the water to be raised, and as the square of the diameter in that part where the piston works. Hence, if two pumps be of equal

height, and one of them be twice the bore of the other, the largest will raise four times as much water as the narrowest, and will therefore require to be worked with four times as much strength.

The wideness or narrowness of the pump, in any other part besides that where the piston works, does not render the pump either more or less difficult to work, except what difference may arise from the friction of the water in the bore, which is always greater in a narrow bore than a wide one.

The pump rod is generally raised by means of a lever, whose longer arm, where the power is applied, is generally five or six times the length of the shorter arm; by which means it gives five or six times as much advantage to the power.

Mr. Ferguson gives the following table for finding the dimensions of a pump that shall work with a given force, and draw water from a given depth, the handle being supposed to increase the power five times. It is also supposed that one man can work a pump four inches diameter, and thirty feet high, and discharge $27\frac{1}{2}$ gallons of water in a minute; the measure being that called English wine-measure.

Height of the pumps above the surface of the well.	Diameter of the bore where the piston works.	Water discharged in a minute.
<i>Feet.</i>	<i>Inches.</i>	<i>Galls. Pts.</i>
10	6.93	81 6
15	5.66	54 4
20	4.90	40 7
25	4.38	32 6
30	4.00	27 2
35	3.70	23 3
40	3.46	20 3
45	3.27	18 1
50	3.10	16 3
55	2.95	14 7
60	2.84	13 5
65	2.72	12 4
70	2.62	11 5
75	2.53	10 7
80	2.45	10 2
85	2.38	9 5
90	2.31	9 1
95	2.25	8 5
100	2.19	8 1

To find the diameter of a pump that shall raise water with the same ease as a man can work a pump thirty feet high, with a four inch bore, look for the height in the first column, and over against it, in the second, is shewn the diameter or width of the pump, and in the third we find the quantity of water which a man of ordinary strength can discharge in a minute.

The Forcing Pump.—This machine is so called, because it not only raises the water into the barrel, like the foregoing, but it afterwards forces it up into a reservoir, in a lofty situation. The operation and nature of this pump will be evident by attending to the working of the model, fig. 2. The pipe and barrel are the same as in the other pump, but the piston, G, is solid, having no valve, so that no water can get above it. At the bottom of the barrel B a pipe M M is fixed, and at right-angles to this pipe a cistern or air-vessel, K K; at the bottom of the air-vessel there is a valve, b; from the top a small pipe, O H I, is inserted so as nearly to reach the bottom of the air-vessel, and at the same time be air-tight at top.

In working this kind of pump, the pipe valve, a, rises when we draw the piston up; but falls down, and stops the hole, the moment the piston is at its greatest height. Now as the water which has been raised above this valve cannot get back again into the pipe, but has a free passage by the pipe M M, that opens into the air-vessel, it is forced into this vessel by depressing the piston, and retained therein by its valve b; which shuts the moment the piston begins to be raised, because the pressure of the water against the under side exists no longer.

The water being thus forced into the air-vessel by repeated strokes of the piston, we suppose to have now got above the lower end, I, of the pipe, and that it begins to condense the air in the air-vessel; for the air has no way to get out of this vessel, but through the tube O H I of the pipe, and is prevented from escaping this way when the mouth of this tube is covered with water. It is also gradually more and more condensed as the water rises in this vessel; till at last it presses so strongly upon the water as to force it up through the pipe O H I; from whence it spouts at F in a jet to a great height, and is supplied by alternately raising and depressing of the piston. The higher the surface of the water is raised in the air-vessel, the smaller is the space into which the air is condensed; and consequently its spring will be stronger, and the pressure greater upon the water, which will be thereby driven with greater force through the pipe; and as the spring of the air continues to act even while the piston is rising, the stream will be uniform as long as the piston is worked.

The valve of the pipe opens to let the water follow the piston in rising. Whilst this valve is open, that of the air-vessel is closed, to prevent the water, which is forced into the air-vessel, from running back by its pipe into the air-vessel.

The effect of this kind of pump is not limited to raising water to any particular altitude; since the air's condensation may be raised to any degree. If the air's condensation is double to that of the atmosphere, its elastic force will raise the water to about the height of thirty four feet. If the condensation be increased three-fold, the altitude to which water may be raised by it will be about twice the former height, or sixty-eight feet; the altitude of the raised water being increased thirty-four feet for each addition of unity to the number which expresses the air's condensation.

The engines used for *extinguishing fire* are upon this construction; consisting of two barrels, by which water is alternately driven into a close air-vessel. The forcing the water therein condenses the air, which compresses the water so strongly, that it rushes out with great impetuosity and force through a pipe that comes down into it, and makes a continued uniform stream by the condensation of air upon its surface. See Sect. vii.

De la Hire's Pump.—This invention is calculated to raise water as fast by the descent as the ascent of the piston. As before, the trough in which the two pipes are placed represents the well: one of the pipes, B, fig. 3. is fitted to the lower end of the barrel, in which the piston works; the top of the other pipe, C, is so connected with a smaller one, as to communicate with the upper part of the barrel. There is a valve on the top of the pipes B, C, and also on the two pipes E F, which proceed from the pump-barrel into the air-vessel P. The piston is solid, or without any valve or opening.

As the piston rises, the air, pressing on the surface of the water in the trough, forces it up the pipe B, at the bottom of the barrel, and fills it with water up to the piston. The valves e and s lie close and air-tight at the top of their respective pipes E and F. When the piston stops at its greatest height, the valve at the bottom of the barrel closes, and prevents the water from being forced back. Hence, as the piston is depressed, it forces all the water in the barrel up through the lower crooked pipe F, and through its valve into the air-vessel. The piston rod

moves through what is called a collar of leather, which makes it air-tight.

During the descent of the piston, the valve upon the upper crooked pipe falls down, and the pressure of the air on the water in the trough raises the water through this pipe, C, and the valve at the top of it, which is opened upwards by the power of the ascending water; and this water runs into the barrel of the pump, and fills all the space therein above the piston. As soon as the piston is as low as it can go, the valve at the end of the upper pipe, D, falls down and closes it, so that no water can be forced back through it. As the piston is raised, all this water is forced through the upper pipe E, and, after opening its valve e, into the air-vessel P.

Thus, as the piston descends, it forces all the water below it up the pipe F; and, as it rises, it forces all the water above it up the pipe E; so that there is as much water forced up into the air-vessel by the ascent as by the descent of the piston. The air is compressed in the air-vessel as in the preceding case; and the water, being equally forced in, rushes out with a constant and very nearly equal stream. It is evident, from what has been already observed, that the top of the pipe that opens into the upper part of the barrel should never exceed thirty-two feet.

New Hand Pump.—This valuable machine was invented by Mr. Walter Taylor of Southampton, and is now used by the navy. Every friend of mankind must rejoice, that the accidents to which ships that spring a leak at sea were liable from the imperfections of the chain pump, are happily removed by this ingenious contrivance. It seems rather surprising that the common pump, whose effects are so well known, should have remained for centuries inadequate to the purposes of the navy. The mechanism adapted by Mr. Taylor is so important, and, in various particulars, so different from what is in general applied to the common pump, that it may with great propriety be considered as a new invention altogether.

These pumps have been in general use in the navy for five or six years, and they have answered every expectation he first formed, though he has made many improvements on them during that period. In the plate are three figures, which will afford a general idea of these pumps; they were copied by Mr. George Adams's directions from drawings which were kindly communicated to him for that purpose by Mr. Taylor. Fig. 4. pl. 19. is a section of one of these pumps, of a simple construction. The piston is represented as descending in a chamber properly adapted to it. At a and b we have a view of Mr. Taylor's pendulum valves; which, from their form, disengage themselves from chips, gravel, sand, &c. The piston is also so contrived, that no chips, gravel, or sand, can get between the leather and lower part of the piston; to both which defects the former constructions were liable. Fig. 7. is a separate view of the pendulum valve.

A pump, working with one piston-rod, is shewn at fig. 3. and at fig. 5 is a pump working with two piston-rods; the one rising as the other falls: in fig. 4 and 5 the rods are supposed to be worked by levers. By a judicious application of ropes, to be carried on either deck, (see fig. 6.) Mr. Taylor is enabled, where men are plenty, as in a man of war, to raise any quantity of water. The drawing is taken from a pump with a seven-inch bore, and heaves one ton per minute twenty-four feet high, with ten men, five only working at a time. One is now constructing by Mr. Taylor to heave five tons per minute twenty-four feet high. The pumps are also so constructed that a copper pump may be taken out of the wooden case, in order, when necessity requires, to make two pumps for separate work.

Heffian Pump.—ABC, DE, fig. 7 and 8. pl. 18, are two tin vessels, folded together, but communicating with each other by a hole at the bottom. The larger vessel is furnished with a rim, to receive the water thrown up by the circulating tubes,

and convey it into the vessel DE. m, n, o, p, represent four tubes of metal, or glass, open at both ends, but bent at top, and fixed in an angular position to the axis KL. When in their place, the extremity L of the axis rests upon a point at the bottom of the large vessel, while the upper part is steadied, and kept in a vertical position, by passing through a hole in a bar going over the large vessel ABC.

To shew the operation of this pump, fill the vessels about two thirds with water, and then make the tubes circulate rapidly by turning the handle S, and the rotatory centrifugal motion will raise the water, and discharge it into the small vessel DE, by the pipe h.

Vera's Pump.—This is an engine to raise water by means of hair ropes. A and B, fig. 8. pl. 19. are three hair ropes passing over the pulleys b and d, each of which has three grooves. The lower pulley b, is immersed in the water, and is kept therein by a weight suspended from it. These pulleys are turned round with great rapidity by means of two multiplying wheels, one of which is seen at G. By turning the pulleys, the cords revolve also with great rapidity, and the ascending sides carry up a considerable quantity of water, which they discharge with violence into the reservoir H, from whence it is conveyed into any convenient place by the pipe KL. The ropes should not be more than an inch asunder.

At Winds, there are two of these machines. The depth of the well where one of them is fixed is ninety-five feet, and the quantity of water raised by the utmost efforts of a man is about nine gallons per minute.

In the beginning of the motion, the column adhering to the rope is always less than when it has been worked for some time, and continues to increase till the surrounding air partakes of its motion.

SECT. VII. Of Fire Engines.

Engines for extinguishing Fire are, in their external figure, their operation, and their uses, too generally known to need a very minute description. They consist either of forcing or lifting-pumps; and being made to raise water with great velocity, their execution in great measure depends upon the length of their levers, and the force wherewith they are wrought.

Before the present improvements took place in these inventions, the attempts to extinguish fires were made with the common squirting fire engine; which consists of the frame of a lifting-pump, wrought by levers acting always together. During the stroke, the quantity of water raised by the piston in these engines spouts with force through a pipe made capable of any degree of elevation by means of a yielding leather neck, or by a ball and socket, capable of turning every way, screwed on the top of the pump. Between the strokes on this machine the stream is discontinued. The engine is supplied by water poured in with buckets above; the dirt and filth whereof are kept from choking the pump-work by the help of a strainer.

A considerable improvement afterwards was made in these machines in order to keep them discharging a continual stream. In doing which it is not to be understood that they really throw out more water than do the squirting ones of the same size and dimensions; but that the velocity of the water, and of course the friction of all the parts, being less violent, the stream is more even and manageable, and may be directed hither or thither with greater ease and certainty than if it come forth only by fits and starts. The machine, thus improved, is therefore generally better adapted to the purpose intended than the former, especially in the beginning of the conflagration.

In the engine we now speak of, the stream is made continual from the spring of air confined in a strong metal vessel fixed between two forcing-pumps, wrought with a common double lever moving on a centre. The pistons both suck and force alternately, and have their respective valves in proper situations.

The water to supply this engine, if there be no opportunity of putting the end of a sucking pipe, occasionally to be screwed on, into a moat or canal, which would spare much hurry and labour in case of fire, is poured into the body of the machine; and being strained through a wire grate, is, by the pressure of the atmosphere, raised through the valves into the barrels, when either of their foreers ascend; whence again it is powerfully pushed forth, when they descend, into the air-vessel through the valves by turns: by the force whereof the common air between the water and the top of the air-vessel becomes from time to time forcibly crowded into less room, and much compressed; and the air being a body naturally endowed with a strong and lively spring, and always endeavouring to dilate itself every way alike in such circumstances, bears strongly both against the sides of the vessel wherein it is confined, and the surface of the water thus injected; and so makes a constant regular stream to rise through the metal pipe, which may be led about into rooms and entries, as the case may require.

Should the air contained in this vessel be compressed into half the space it took up in its natural state, the spring thereof will be much about doubled; and as before it equalled and was able to sustain the pressure of a single atmosphere, it having now a double force, by the power of that spring alone will throw water into air, of the common degree of density, about thirty feet high. And should this compressure be still augmented, and the quantity of air which at first filled the whole vessel be reduced into one-third of that space, its spring will be then able to resist, and consequently to raise the weight of a treble atmosphere; in which case, it will throw up a jet of water sixty feet high. And should so much water again be forced into the vessel as to fill three parts of the capacity, it will be able to throw it up about ninety-feet high: and wherever the service shall require a still greater rise of water, more water must be forced into this vessel; and the air therein being thus driven by main force into a still narrower compass, at each explosion, the gradual restitution thereof to its first dimensions is what regularly carries on the stream between the strokes, and renders it continual during the operation of the machine.

But the improvements made on fire-engines have been so considerable, as to render either of the former little worthy of notice. To describe each, however, would require an unreasonable extension of this section; and for this reason, though all may have their degrees of merit, we shall confine ourselves to the description of the engine invented by Rowntree and Co. in Black-Friars Road, London, which is certainly the best on many accounts.

Fig. 1, in plate 20, presents an end view of the working part of this engine, supposing the engine cut down the middle. A is a metal cylinder. B a piston or plunger acting in a circular direction by means of the levers CC, fixed upon the ends of its axis. DD, the lower valve boxes on the outside the cylinder, with each a valve EE. These boxes are large, and so constructed as to prevent the metal cylinder being clogged up with gravel, sand, or other dirt, which frequently is the cause of other engines being useless after working a short time. These boxes have each a clack door on the outside, which screws off for the convenience of taking out the gravel, sand, or other dirt which may have collected there; by which means the engine is always kept in a working state.

These clack-doors are shewn at A, fig. 2. E the upper box with its valves FF. G the air-vessel. H the discharge pipe, and I the pipe that conveys the water to the engine, commonly called the suction pipe.

Fig. 3 represents a side view of the working parts. A the metal cylinder. B the piston and axle. F the upper valve box. HH the discharge pipes covered with caps KK, which screw off when the engine is played, and the leather pipes and branches are screwed on. G the air-vessel. II the suction

pipe. L, L, L, L, springs fixed to the side of the wood cistern.

Fig. 4 is a perpendicular view, where AA represents the cylinder. B the piston and axle. D, D the valve boxes. C, C, C, C, C, C, C, C, the levers fixed on the piston-axle, and connected by the bars PP. OO bearings for the axle of the piston.

At fig. 2 the engine is shown in profile with its handle, &c. ready for working. M a wooden cistern. L, L, L, L, four springs firmly fixed to the sides of the cistern, on which the levers C, C, C, C, C, C, C, C, strike. In working, these springs help to return the stroke, so that the arms of the men employed are effectually relieved from that heavy shock attendant on the use of all other engines. P the bars which connect the levers C, C, C, &c. and at a small distance from which the wooden handles N, N are fixed. K, K the caps on the discharging pipes, which are to be taken off to fix the leather-pipe or branches on, when the engine is to be put in action.

This engine has been proved, to the satisfaction of the best judges, to be, in point of simplicity and execution, the most complete machine for extinguishing fires ever yet invented; and has accordingly been adopted, in preference to all others, by the principal fire-offices in London.

SECT. VIII. *Improvements of the Common Pump.*

In the year 1766 it was announced in the public papers, that at Seville in Spain, a simple sucking pump had been constructed, which raised water sixty feet; and they concluded from thence, that those were strangely deceived who had asserted that the pressure of the atmosphere would not support a higher column than thirty-two feet. On examination it was found, that an ignorant tin-man at Seville had made a common sucking pipe with its lower valve sixty feet from the surface of the water; but finding he could raise no water by it, either through impatience or passion, with a stroke of a hatchet he made a small opening about ten feet above the surface of the water, and which forced a small quantity of water above the lower valve; the reason of which we shall explain by a diagram. See fig. 1. plate 19.

Suppose PF the sucking tube, d the surface of the water, from d to F sixty feet; and that after a certain number of strokes of the piston, the water was raised thirty-two feet in the tube, or to c; and that then a small hole was made at ten feet from the surface of the water. The air which enters this pressing equally every way, makes the water which is below b fall down into the well; while the pressure upwards forces the water up thirty-two feet through the valve into the body of the pump. But this is not all, for it would have carried it to a much greater height; for the air near the earth is above eight hundred times rarer, or less dense, than water; and supposing the density of a column thereof to be uniform (which is not the case), ten feet of water taken away would be equivalent to a column of eight thousand feet of air; so that the remaining twenty-two feet would be in equilibrium with the air, after being raised eight thousand feet. To have a second portion of water, the hole b must be stopped up, and the piston worked till the water rises to c, and then re-open the hole. In the first place we see, that this pretended discovery is so far from invalidating the principle of the pressure of the air, that it is a direct consequence thereof; secondly, that even to make it answer at all, it is necessary that the pipe be very small, or the column of water would be broken to pieces, the air would pass through, and very little would rise.

But a real improvement of the common pump has been made by Mr. Todd of Hull. This invention in some particulars bears a resemblance to the ordinary one, but he has contrived to double its powers by the following means:

Having prepared the piston cylinder, which may be twelve feet high, he cuts from the bottom thereof about three feet;

at the end of the great cylinder he places an atmospheric valve, and to the top of the small cylinder a serving valve. In the bottom of the small cylinder, which contains the serving valve, is inserted an oblong elliptical curved tube, of equal calibre with the principal cylinder, and the other end is again inserted in the top of the great cylinder. This tube is divided in the same manner as the first cylinder, with atmospheric and serving valves, exactly parallel with the valves of the first cylinder. The pump, thus having double valves, produces double effects, which effects may be still farther increased by extending the dimensions.

The cylinder is screwed for service on a male tube-screw, which projects from the side of a reservoir or water cistern, and is worked by hand.

The piston-plunger is worked by a toothed segment-wheel, similar to the principle of the one used in working the chain-pumps of ships belonging to the royal navy (see pl. 20.); and the wheel receives motion from a hand-winch, which is considerably accelerated by a fly-wheel of variable dimensions, at the opposite end.

This pump, in addition to its increased powers, possesses another very great and prominent advantage. By screwing to it the long leather tube and fire-pipe of the common engine, it is in a few minutes converted into an effective fire-engine. Hence, whoever possesses one may be said to have a convenient domestic apparatus against fire. Three men can work it; one to turn the winch, another to direct the fire-pipe, and a third to supply the water.

SECT. IX. *Of the Motion of Water in Conduit Pipes.*

In conducting water from one place to another, the conduit-pipes must be longer in proportion as the places to which it is to be conveyed are more distant from each other. In the additional tubes heretofore spoken of, we took no notice of *friction*, as in the cases then under consideration it was scarcely sensible. In long tubes, however, it is different; for the friction of these lessens considerably the velocity of the water.

On this part of our subject, all that is necessary is to relate the result of the various experiments that have been made. In those of M. Bossut, the tubes were straight; one of them was sixteen lines inside diameter, the other two inches; and the tubes were successively lengthened from thirty to an hundred and eighty feet. The constant altitude of the water in the reservoir, above the axis of each tube, was in some cases one foot, in other cases two feet. This is a branch of hydrostatics, in which theory is necessarily imperfect, and the only means of arriving at truth must be from experiment.

Constant altitude of the water in the reservoir above the axis of the tube, expressed in it.	Distance to which the water was conveyed, expressed in it.	No. of cubic inches of water discharged by the tube of 16 lines diameter in a minute.	No. of cubic inches of water discharged by the tube of two inches diameter in a minute.
1	30	2778	7680
1	60	1957	5564
1	90	1587	4534
1	120	1351	3944
1	150	1178	3486
1	180	1052	3119
2	30	4066	11219
2	60	2888	8190
2	90	2352	6812
2	120	2011	5885
2	150	1762	5232
2	180	1583	4710

By comparing this with the table in page 563, it appears that the discharges of water there are much greater than the corresponding ones in the present table, and that the discharge is lessened as the tube is lengthened, because there is a greater surface for friction. We may also notice that the diminution in the discharge is not in proportion to the length of the tube; for the first thirty feet diminishes the discharge much more than the second thirty feet, and the third length of thirty feet diminishes still less in the discharge, and so on.

From these experiments it appears, that great accuracy is not necessary in practice; and perhaps we may adopt for a general rule, 'that the discharges made in equal times by an horizontal tube, with the same altitude of reservoir, but at different distances from the first aperture of the tubes, are to each other nearly in the inverse ratio of the square roots of the distances.' The discharge is more in proportion from the larger tube than from the smaller one; because there is less rubbing surface in proportion in the larger tube.

If the tubes are curved, instead of being straight, the discharge will be somewhat diminished. This diminution in the discharge appears to arise from the impact of the water against the angular parts of the tube, whereby its velocity is diminished. This diminution will therefore vary with the degree of curvature.

When the plane of the curvature of the tube is in a vertical direction, there will be portions of the tube where the air will fix itself, so as to lessen the velocity, or even stop the course of the water. Let ABCDE, fig. 9. pl. 18. be a tube, whose upper end A is joined to the reservoir that furnishes the water, G the end by which the fountain is supplied. When the communication at A is opened, the tube is filled with air; the water will fill the tube AB, drive out the air, and rise to C. Here experience has shewn, that the water runs down the lower part of the curvature, and fills up the neck D, leaving behind it the column of air CD; which will remain there, notwithstanding the pressure of the column of air AB. The water continuing to flow, runs down the lower part of EF, and fills the neck F, leaving the second column of air at EE; so that the water will be only raised to I, and will not run out at G.

SECT. X. *Of the Syphon.*

A *SYPHON* is an instrument used to decant fluids, or convey them from one place, over an obstacle that is higher than their surface, to another that is lower. Its form is exceeding simple, being nothing more than a crooked tube, one extremity of which descends lower than the other. Its effects are accounted for from the gravitation of fluids of different weights, one upon another.

If one leg of a syphon be immersed in a vessel of water, and the other leg hang out of it, in such manner that the lower end be below the surface of the water; on opening both the orifices at the same instant, the water will be found to flow out at the lower orifice, till its surface has sunk down to the orifice of the leg in the water.

Now, on examining this experiment, you will find, that the columns of air pressing on the two equal orifices differ from each other in length only by the *perpendicular distance between the surface of the water, and the horizontal plane of the lower orifice of the syphon*; which space, compared with the whole height of the atmosphere, is too inconsiderable to be taken into the account; and we may therefore conclude, that the action of the atmosphere on both the orifices is *equal*.

Now, as we supposed the tubes full of water when the holes are first opened, these *equal* pressures of the atmosphere will be counteracted by the weight of two *different* columns of water; one in the shorter, the other in the longer leg of the syphon. The difference of the force of these counteracting pressures is equal to the weight of a column of water whose base is equal to

the diameter of the tube, and whose height is equal to the perpendicular height of the surface of the water from the orifice of the longer leg. Now equal pressures of the atmosphere will be counteracted by unequal forces of gravitating waters, which will make the opposite pressures of the vertex unequal: and as the superior weight of the longer column carries it downwards, there is less pressure on that side of the vertex; the water will be pressed forwards, and continue to flow till the water be fallen to the bottom of the immersed leg, or (if it be the longer leg) as low as the end of the flowing one; for the descent of the water in the longer leg, by its own gravity, would leave a vacuum in the tube, if not immediately succeeded by other water. This descent gives the atmosphere, which urges the water up the syphon, the same power to act as if it were not at all opposed at the issuing orifice.

For the same reason that the atmosphere urges the water in the vessel after that which descends, it would fill the whole syphon, provided it were void of air; and by sucking the air out of the smaller kind of these instruments with the mouth, through a pipe placed for that purpose by the side of the issuing leg, they are easily set a-running. In larger syphons, for the draining of pits, quarries, &c. the evacuation is effected by a pump placed in like manner at the issuing end.

The Distiller's Syphon.—This is usually about an inch in diameter, and three feet in length, with a cock fixed into the issuing end. To use it, the cock is shut, and the contrary end is put into the bung-hole, till the liquor reach within about five or six inches of the bend. Then, on opening the cock pretty quickly, the contents flow out of the syphon in the usual manner. By the immersion of the drawing leg, the liquor is prevented by the pent-up air from rising as high within the syphon as it is on the outside. On opening the cock, the ambient fluid obtains power to raise that within the tube to its own level; but, by a law already explained, the contained liquor, before it rises as high as that of the other, will have acquired a velocity nearly sufficient to carry it as much above that surface as it was before below it. Hence the fluid shoots over the bend; and there falling into a tube with a contracted orifice, the syphon is soon filled, and of course continues to flow. See pl. 17.

Gravesande's Syphon.—This is a syphon for raising water into a cistern by means of the expenditure of other water through the outer leg, and may be applied to many cases where water, &c. is to be raised ten or twenty feet, and where you have at the same time water sufficient to supply the lower reservoir. This syphon has been lately much improved by a very ingenious gentleman. See Gravesande's Elements of Philosophy, vol. i. p. 235.

Several entertaining deceptions have been practised by means of the Syphon. One of the most usual is that of *Tantalus's Cup*, a view of which we have given in pl. 17, but the explanation of which is not necessary here, as its operation will be evident at the first view. It is usual to conceal the syphon in the figure of a man, representing Tantalus; and when the cup is filled with water as high as his mouth, that is, a little above the curve of the syphon, the latter beginning to act at length discharges the whole contents of the cup. Similar deceptions have been practised by concealing the syphon in the handle of a drinking vessel.

We shall conclude this part of our subject with some account of a *Clepsydra* invented by Mr. C. Hamilton, and depending on the action of syphons. See in pl. 20 a view of this machine, to which the following explanation is applicable.

An open canal *ee*, supplied with a constant and equal stream by the syphon *d*, has at each end, *f, f*, open pipes of exactly equal bores, which deliver the water that runs along the canal *e*, alternately into the vessel, *g 1, g 2*, in such a quantity as to raise the water from the mouth of the tantalus *t* exactly in an hour. The canal *ee* is equally poised by the two pipes *f 1, f 2*, upon

a centre *r*; the ends of the canal *e* are raised alternately, as the cups *zz* are depressed, to which they are connected by lines running over the pulleys *l, l*. The cups *zz* are fixed at each end of the balance *mm*, which moves up and down upon its centre *v*: *n 1, n 2*, are the edges of two wheels or pulleys, moving different ways alternately, and fitted to the cylinder *o* by oblique teeth both in the cavity of the wheel and upon the cylinder, which, when the wheel *n* moves one way, that is, in the direction of the minute hand, meet the teeth of the cylinder and carry the cylinder with it; and when *n* moves the contrary way, slip over those of the cylinder, the teeth not meeting, but receding from each other. One or other of these wheels *nn* continually moves *o* in the same direction, with an equable and uninterrupted motion. A fine chain goes twice round each wheel, having at one end a weight *x*, always out of water, which equibonderates with *y* at the other end, when kept floating on the surface of the water in the vessel *g*, which *y* must always be; the two cups *z, z*, one at each end of the balance, keep it in equilibrio, till one of them is forced down by the weight and impulse of the water, which it receives from the tantalus *t t i*: each of these cups *z, z*, has likewise a tantalus of its own *bb*, which empties it after the water has done running from *g*, and leaves the two cups again in equilibrio: *q* is a drain to carry off the water. The dial-plate, &c. needs no description. The motion of the *clepsydra* is effected thus: As the end of the canal *ee*, fixed to the pipe *f 1*, is, in the figure, the lowest, all the water supplied by the syphon runs through the pipe *f 1*, into the vessel *g 1*, till it runs over the top of the tantalus *t*; when it immediately runs out at *i* into the cup *z*, at the end of the balance *m*, and forces it down; the balance moving on its centre *v*. When one side of *m* is brought down, the string which connects it to *f 1*, running over the pulley *l*, raises the end *f 1* of the canal *e*, which turns upon its centre *r*, higher than *f 2*; consequently, all the water which runs through the syphon *d* passes through *f 2* into *g 2* till the same operation is performed in that vessel, and so on alternately. As the height the water rises in *g* in an hour, viz. from *s* to *t*, is equal to the circumference of *n*, the float *y* rising through that height along with the water, lets the weight *x* act upon the pulley *n*, which carries with it the cylinder *o*; and this, making a revolution, causes the index *k* to describe an hour on the dial-plate. This revolution is performed by the pulley *n 1*; the next is performed by *n 2*, whilst *n 1* goes back as the water in *g 1* runs out through the tantalus; for *y* must follow the water, as its weight increases out of it. The axis *o* always keeps moving the same way; the index *p* describes the minutes; each tantalus must be wider than the syphon, that the vessels *g g* may be emptied as low as *s*, before the water returns to them. See drawings of this instrument in different positions, with a description in the Philosophical Transactions.

SECT. XI. Of the Vibratory Motion of Water in a Syphon.

It is a known fact in Mechanics, that the vibrations of a pendulum are isochrone, or of the same duration, though the arches it describes are unequal. It is also acknowledged, that in their duration, the vibrations of two unequal pendulums are to each other as the square root of their respective lengths. The motion of water vibrating in a syphon follows the same laws.

To illustrate this, let us suppose *l, o o m*, to be a syphon consisting of three parts, or legs; two, *ln, mo*, vertical, and one, *no*, horizontal; and that it be of an equal diameter throughout its whole extent. Let us further suppose, that the fluid, while at rest, occupies the space *an o d*, the two surfaces, *a b, c d*, will be level. Now if by any means the fluid be forced to descend to *g b* in the leg *no*, it will rise to *ef* in the leg *ln*; and as soon as this cause ceases to act, the fluid is left alone to the action of its gravity. The excess in length of the column *ez*

over the column bo , will force the fluid to descend even below the level of the other, on account of the acceleration it acquires in descending, which will raise the fluid in the other leg; and it will thus continue rising and falling alternately, forming oscillations similar to those of a pendulum; and the duration of each vibration will be precisely the same as the vibration of a pendulum whose length is half the length of the column pqr of the fluid.

As the oscillations of water follow the same laws as those of a pendulum, if the length of the column of water is increased or diminished, the duration of the oscillations will be also augmented and diminished, and will be in a subduplicate ratio of this length.

SECT. XII. *Of the Oscillatory Motion of Waves.*

THE great *Newton*, in his *Principia*, compares the undulatory motion of waves to the vibratory one of water in a syphon. Let $ABCDEF$, fig. 10, pl. 18, represent a stagnant water, whose surface is elevated and depressed by successive waves. Let A , C , E , be the convex, and B , D , F , the concave part of the waves. As waves are formed by the successive ascent and descent of the water, so that those parts which were the highest become the lowest alternately and successively; and as the moving force which makes the lowest parts rise, and the highest sink, is the weight of the elevated water, this ascent and descent may be considered as analogous to the vibratory motion of water in a syphon, and observes the same laws.

If, therefore, we have a pendulum, whose length is equal to half the transversal distance between the most convex point A , and the most concave point B , that is, equal to the half of Ab ; the highest part will become the lowest during the vibration of such a pendulum, and in another vibration they will become the highest, going through its whole space while the pendulum performs two vibrations. And as a pendulum whose length is quadruple the preceding one, that is, which is equal to the width AC of the waves, would perform but one vibration while the other performed two, we conclude that the waves perform their vibrations in the same time as a pendulum whose length is equal to the breadth of the waves.

From hence it follows, that a wave, whose breadth is 3 feet $8\frac{1}{2}$ lines broad, by advancing its whole breadth in one second, would in a minute describe 183 feet 6 inches 10 lines; and in an hour, 11014 feet 2 inches. If the breadth was quadruple, it would describe the breadth in double the time; consequently the broader they are, the greater space they describe in a given time.

In this view of the subject, we have assumed that the waves rose and fell in straight lines; but this is not exactly true, and consequently the deductions can only be considered as approximations towards the truth.

SECT. XIII. *Of the Resistance of Fluids.*

ONE of the most important problems in hydrostatics, is to determine the resistance that a body in motion meets from a fluid at rest; and to know the effort necessary to keep a body at rest in a fluid in motion. Water and air are two of the great inanimate agents in nature, and they are those which man renders most easily subservient to his purposes. Necessity first pointed out the use of these agents, and engaged him to investigate their properties. In this respect, however, much of his labour has been spent in vain; particularly that which has been employed in the resolution of the above-mentioned problems. These have hitherto evaded every research, though they have engaged the attention, and exercised the talents, of the greatest mathematicians in Europe. It has been shewn, by many instances, that the philosophy of the *ancients* was neither so unreasonable, nor so limited, as it has often been represented. It does not, how-

ever, appear, that they were well versed in the science that is termed *mixed mathematics*, or mathematical philosophy; a science which consists in the application of calculation to the phenomena of nature. Among the branches of this science which they have the least studied, we may reckon that of the resistance of fluids; for we must confess, that they had obtained some knowledge thereof, as it was necessary for the construction of their ships, the principles of building which they had carried further than the moderns.

Modern mathematicians have imagined themselves able to discover the motions, and penetrate into the elements of bodies, by the aid of geometry and calculation. By the assistance of these alone they conceived it was possible to investigate the nature of fluids, discover the working of the parts, and the action of those innumerable particles which go to constitute a fluid; particles which, at the same time, are, as it were, united and separated, dependent and independent one of the other. Notwithstanding, however, the aid of geometry, and the fluxionary process, they have made little or no progress in the knowledge of the resistance of fluids. The desire of using calculation has determined their principles; whereas their first business should have been to have examined these principles by experiment and observation, instead of bending and twisting experiments to make them subservient to the powers of calculation.

Sir Isaac Newton, to whom philosophy and geometry are so much indebted, was the first who undertook to determine, on mechanical principles, the resistance a body meets with when moving in a fluid medium. Unfortunately for science his labours were not successful. His first theory consists of ingenious researches, that may awaken curiosity, but which are not applicable to nature; his second, though more conformable to the nature of fluids, is too complicated, and subjected to too many difficulties, to be reduced to practice.

Since his time, many able geometricians have endeavoured to render this theory more perfect; among these we are to reckon Bernouilli, D'Alembert, and Euler, who have made upon this subject the most profound researches, but which are too complicated for practice. New experiments were afterwards made by these gentlemen, which were so far from according with the theory, that they contradicted some of its most important rules. M. Bossut and Borda endeavoured in vain to solve these difficulties, and remove these contradictions.

In the year 1775 Messrs. D'Alembert, Condorcet, and Bossut, instituted, by order of government, a set of experiments on the impact of fluids, which they have published in a work on that subject: after a number of experiments, they were obliged to confess, that the generally received theory was found to be essentially defective. The importance of this subject is so great, that there is little room to doubt, that the society lately established for promoting the branches of science relative to naval affairs, will find means to extricate this part from its present opprobrious state. But though the theory delivered by Sir I. Newton is confessedly imperfect, as another and more perfect one has not been established, it will be necessary in this place to give a short account of its principles.

A body cannot move forward in water or any other fluid, without removing the parts of the fluid which lie before it out of the way; but as these particles possess that general property of matter which is called their inertia, this resistance will be made by the most perfect as well as the most imperfect fluid, by air as well as by liquid honey. For, if a body move in a fluid, it must give motion to a certain quantity of that fluid, and the reaction of that quantity will destroy part of the motion of that body. But by displacing the fluid, and communicating motion, it loses an equal quantity of its own motion, from whence we obtain some idea of the resistance of the fluid: much here will, however, depend on the form, magnitude, &c. of the moving body.

and the velocity of its motion; for a greater body will displace a greater quantity of the fluid than a smaller one, every thing else being the same; and the greater the velocity wherewith a body moves in a fluid, the more motion will be communicated thereto, and consequently lost to the body.

There is another cause of resistance which arises from the tenacity of the parts of a fluid; for, as a body cannot move forward in a fluid till the parts that lie before it are removed out of the way, the adhesion or tenacity must necessarily resist its motion. There is a third cause of resistance, that is, the friction of the body against the particles of a fluid; but this, from the nature of fluids, is deemed to be very inconsiderable. The resistance will also depend on the fluid's density, every thing else being the same; for it is manifest, that it will require more force to displace a given quantity of mercury than the same quantity of water, and a quantity of water than an equal quantity of air.

But the principal resistance which fluids give to bodies in motion is supposed to arise from the inertia of their parts, and this depends on the *velocity of the moving body*, and that for two reasons. In the first place, the quantity of fluid moved out of its place, in any determinate space of time, must be greater in proportion as the body moves with greater velocity through the fluid. And, in the next place, the velocity with which each particle of the fluid is moved, will also be proportional to the velocity of the body; for it communicates a greater or less quantity of motion to each particle in proportion to the velocity of its motion, and will therefore be resisted on this account also in the proportion of the velocity. Since the resistance which any body makes against being put in motion, is proportional both to the quantity of matter moved, and the velocity it is moved with; but as the resistance of a fluid is as the velocity of the body moving therein, it will be doubly increased, 1. Because the number of particles moved is as the velocity of the moving body. 2. Because the resistance arising from a given number of particles is also as the velocity of the moving body. Therefore the resistance is considered as being in a duplicate proportion of the velocity of a moving body, or as the square thereof.

A cylinder moving in a fluid, in the direction of its axis, is resisted by a force equal to the weight of a column of a fluid, the base of which is the base of the cylinder, and altitude equal to the space through which a body must fall freely from rest to acquire the velocity of the cylinder's motion. A sphere moving in a fluid is opposed by a resistance, which is to the force which resists a cylinder moving in the direction of its axis with the same velocity, in the proportion of 1 to 2.

Two suppositions are generally taken for granted, in proving the propositions on the resistance of fluids: 1. That the fluid in which the body moves is so compressed, that its pressure on every part of the moving bodies shall be the same as when they are at rest. 2. That the hinder part of the solids contribute nothing to the resistance, which will be the same as if the anterior part only were exposed to the fluid. This last supposition is not admissible, for the hinder part of most solids contributes to lessen the resistance by the power it receives from the returning curves of the fluid.

The theory of resistances opposed to bodies moving in perfect fluids, could not even be demonstrated by Sir I. Newton but under certain conditions and restrictions. 1. The particles of fluid wherein the bodies move are supposed to be perfectly non-elastic. 2. The fluid is imagined to be infinitely compressed. The second condition is allowed not to obtain in any fluid whatsoever, and it is doubted whether the first is strictly applicable even to the most perfect known fluids.

It is certain that the resistance of fluids depends on the cohesion, tenacity, and friction, as well as the inertia of the matter moved; but the illustrious author of the theory here slightly touched upon considered the geometrical estimation of these

circumstances as of no use in physical inquiries. He therefore chiefly noticed the properties of retardation, which bodies suffer when moving through fluids, the cohesion and friction among whose parts were in a physical sense evanescent.

The doctrine of hydrostatics and hydraulics, like every other part of philosophy, serves to shew the weakness and imperfection of human knowledge, and how ignorant we are even of those subjects in which we are deeply interested, and with which we are continually engaged. It also shews us how long human ingenuity may be exercised, without improving the science on which it is exercised. In every other part of natural science new discoveries are made, and new phenomena are brought to view, which enlarge the boundaries of knowledge, though they convince us of greater objects and numerous phenomena that remain concealed from our observation; but in hydrostatics and hydraulics, little that is new has been discovered, and a general shade of ignorance seems to be cast over the whole science.

SECT. XIV. *Of a New Principle in Hydraulics.*

IN Vol. VI. of the Repertory, there is given a specification of the Patent granted to Mr. JOHN RICHMOND, of London, for his discovery of the application of a principle in Hydraulics, suitable to an Hydraulic Machine which he invented for raising water, from all depths, out of mines, pits, or wells, and for other purposes.

He says, "The machine or engine is to consist of three working pumps, tubes, or barrels, of any size and diameter that may be found most convenient for use, and suitable to the purpose and situation of the place where they may be wanted. These are to be joined together as pumps usually are, or in any manner found most convenient to keep them firm and tight in an upright position. But the upper and lower pumps, tubes, or barrels, are to be of equal bores, and the middle one is to be of a diameter that shall contain a larger quantity of water, in any given length of pipe, than what either of the other two can contain, even to double the quantity, or more, and is to be open at top, so as to admit of a free passage for air, notwithstanding its junction with the upper pump, tube, or barrel, by means of a hollow trumpet-tube hereinafter mentioned; but it is to be close at the bottom, where it joins the lower pump, tube, or barrel, excepting a hole to be left for the pump-rod to pass through. By this means, the hydrostatic paradox is introduced to act upon the bottom part of a hollow tube, which is to be worked within the upper and middle pump, tube, or barrel, and to be of a length sufficient to make the full stroke of the engine, of whatsoever length it may be; with its lower end of a diameter sufficient to fill the bore of the middle pump, tube, or barrel, and its upper end to fill the bore of the upper pump, tube, or barrel, in the form of a trumpet, or any such-like form, in order to admit the motion up and down to the full extent of the engine's stroke, and to receive the pressure of the water underneath on its expanded bottom; which may be opened and shut with a valve, or not, as may be found most beneficial. From the middle pump, or tube, to the lower one, a communication is to be made by a hole, as before mentioned, through which the pump-rod is to pass, connected with the aforesaid movable tube, and to be fixed to a movable bucket and valve, which is to be worked in the lower pump, tube, or barrel; the lower end of which pump, tube, or barrel, is to be immersed in the water, and to have a fixed box, and a valve, in the like manner as other pumps have, for the purpose of lifting water. The pump-rod, which is to be carried through the upper pump, tube, or barrel, to the top of the pit or well, or to the ends of the pumps, tubes, or barrels, for the purpose of working the machine, either by fire, water, wind, horse, man's labour, or other motive force, is to be connected with the movable tube before mentioned, so as to lift it up and down, to make a stroke

Fig. 1.

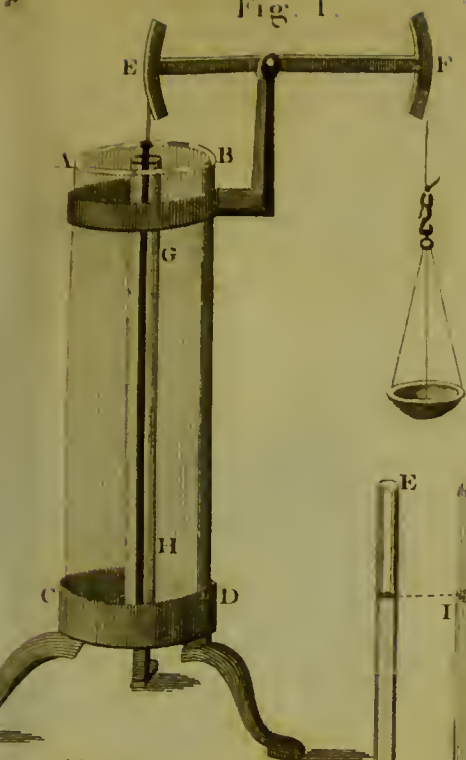


Fig. 2.

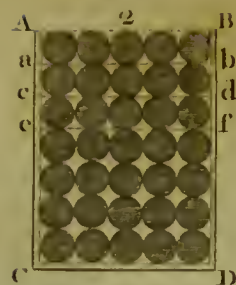


Fig. 3.

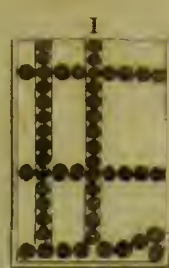


Fig. 4.

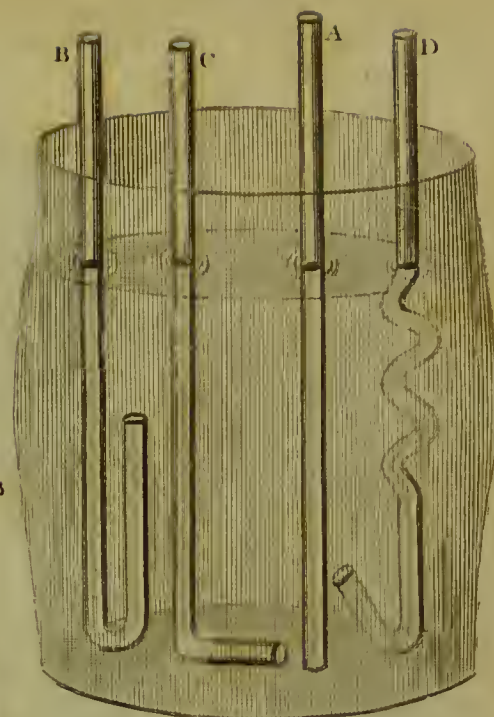


Fig. 5.

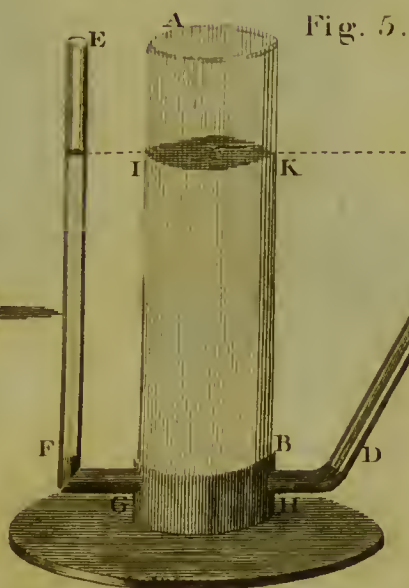


Fig. 6.

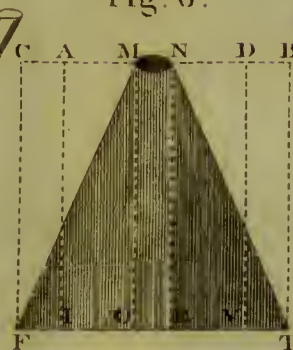


Fig. 7.

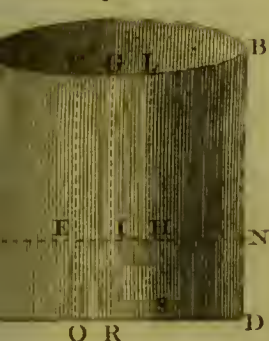


Fig. 11.

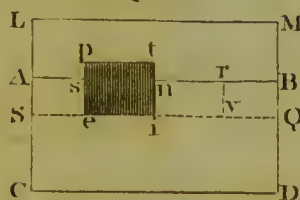


Fig. 13.



Fig. 10.



Fig. 8.

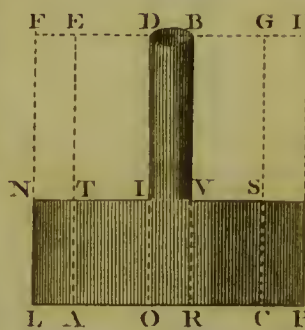


Fig. 9.

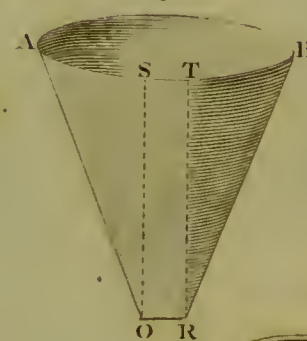


Fig. 11.



Fig. 15.

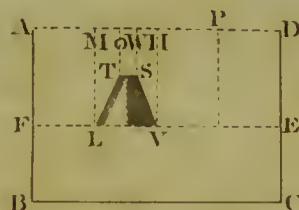


Fig. 12.



Fig. 17.

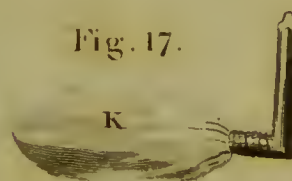


Fig. 18.

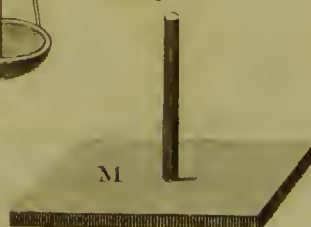


Fig. 16.

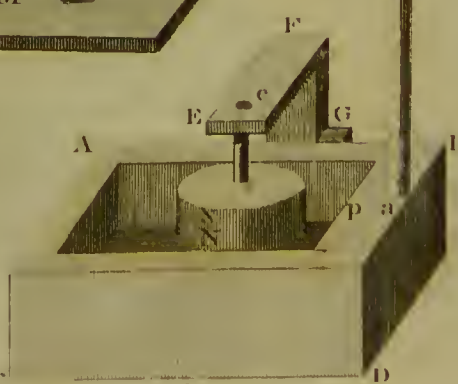


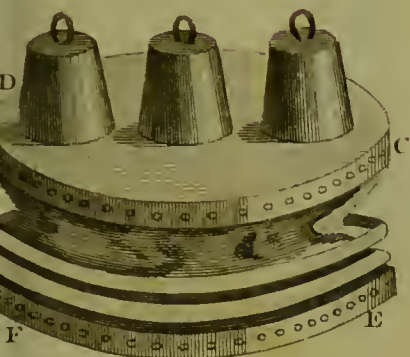
Fig. 19.





Hydrostatic Bellows.

Fig. 1.



Tantalus's Cup.



Fig. 6.

Fig. 3.

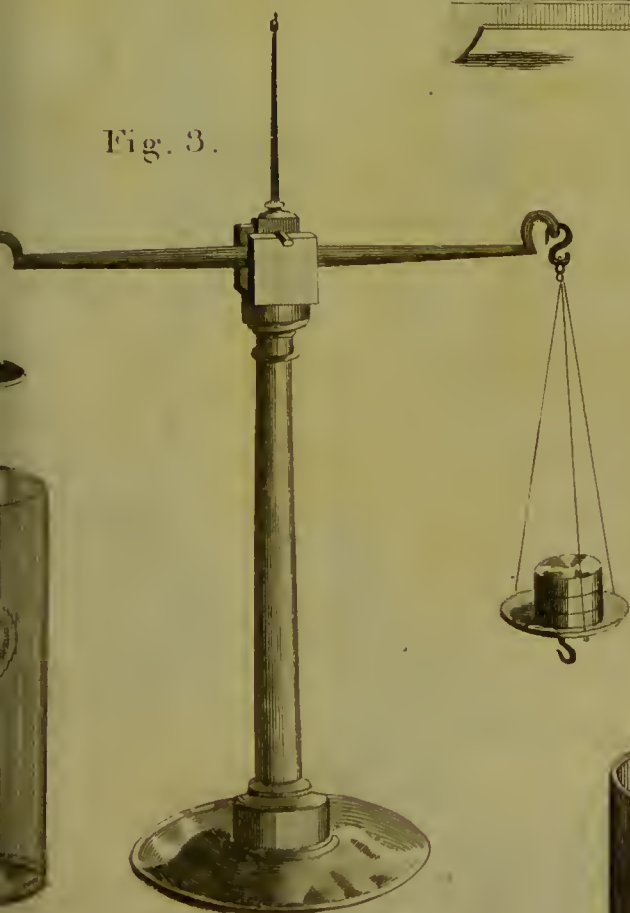


Fig. 4.

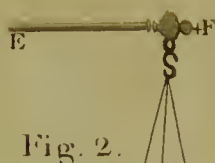
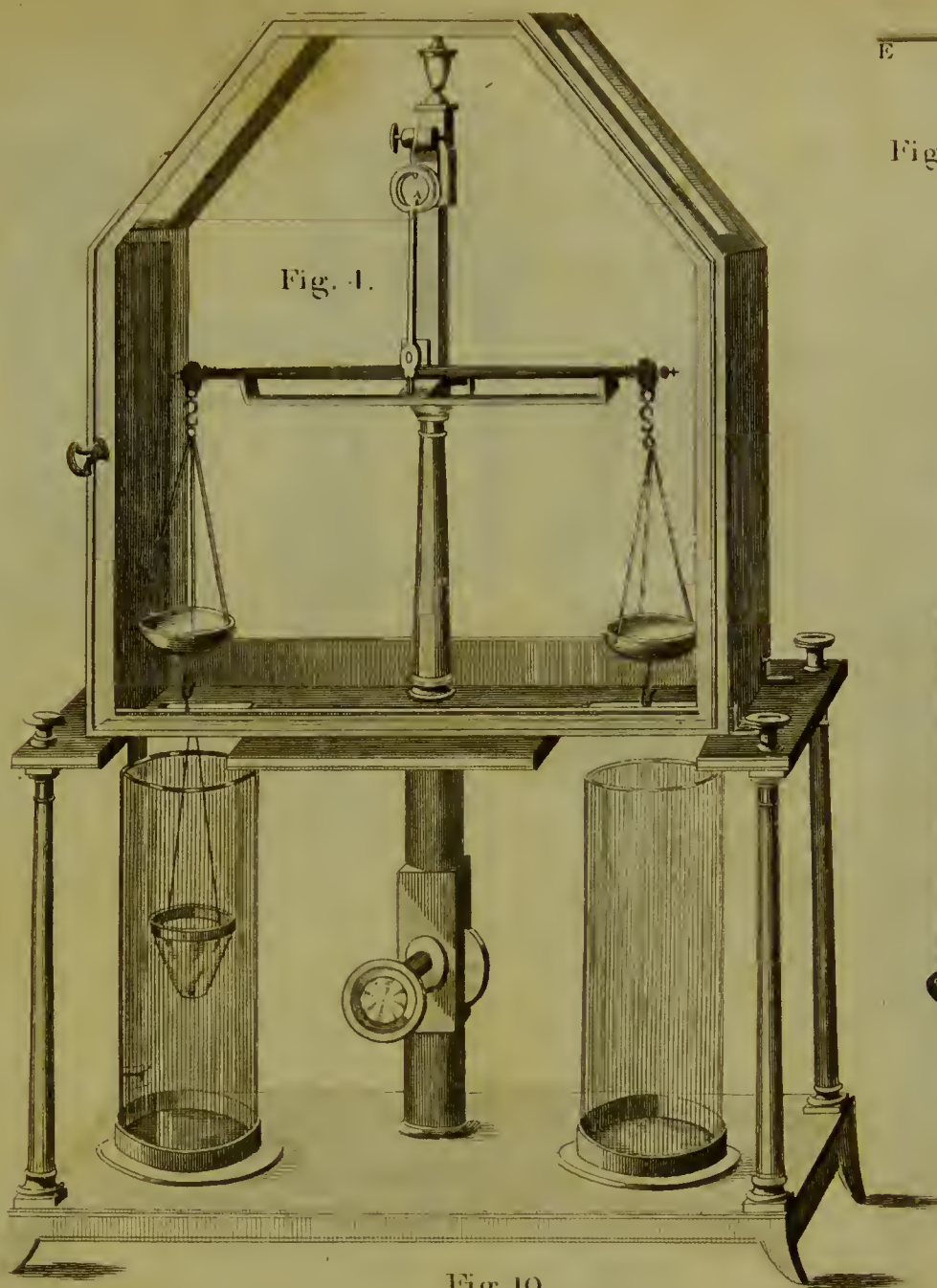


Fig. 2.

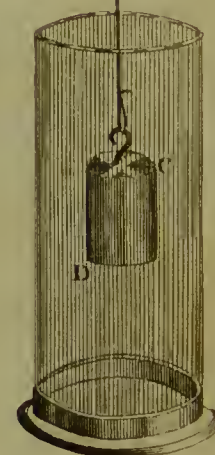


Fig. 10.

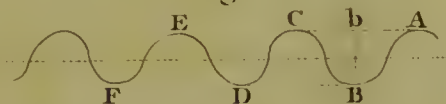


Fig. 9.

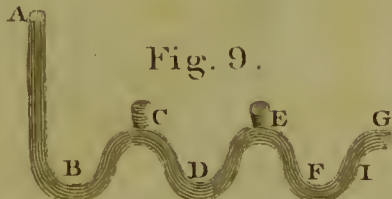


Fig. 7.

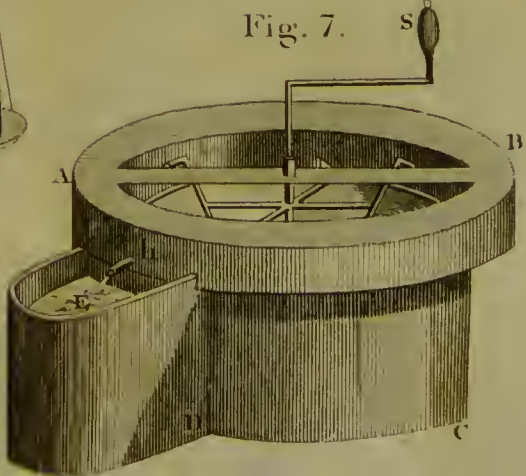
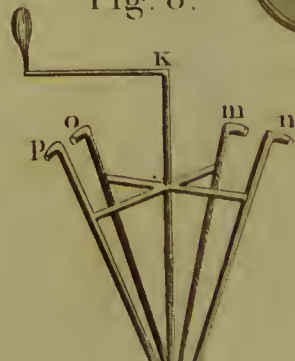


Fig. 5.



Fig. 8.



Pumps.

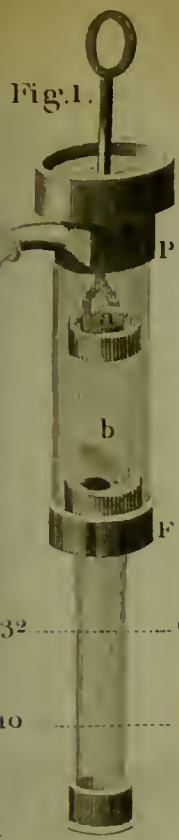


Fig. 2.

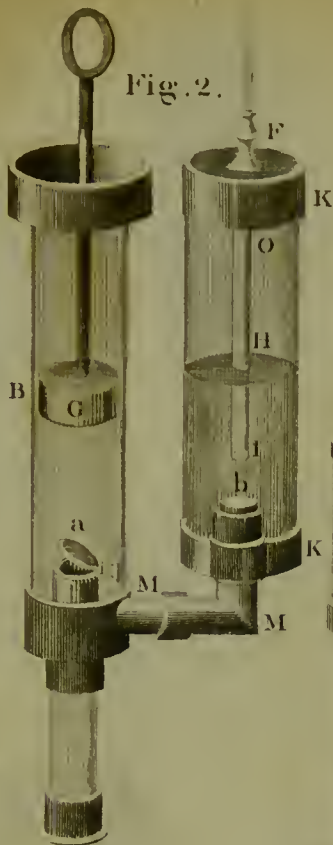


Fig. 3.

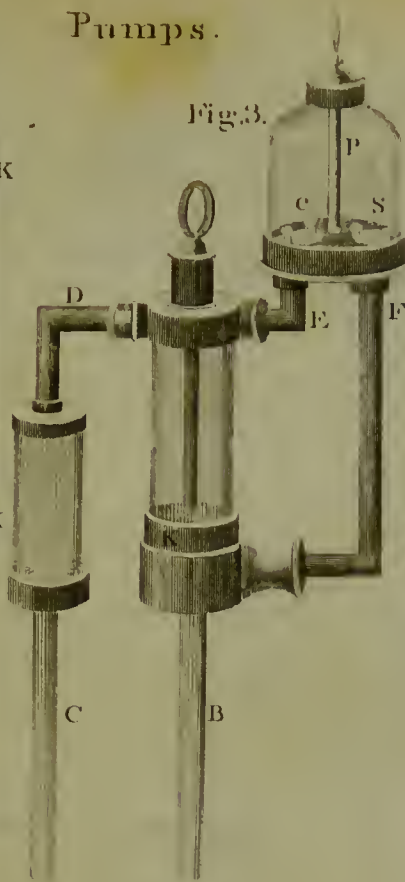
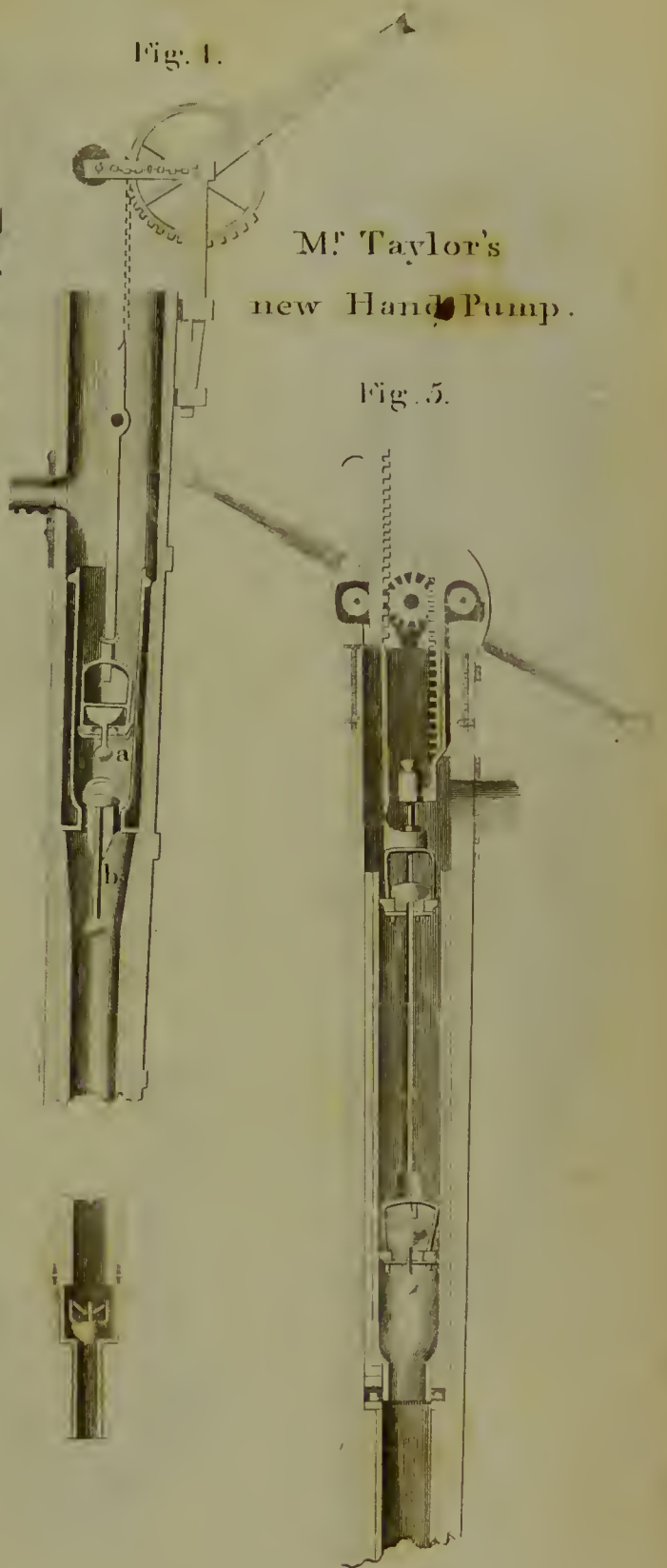


Fig. 4.



Mr Taylor's
new Hand Pump.

Fig. 5.

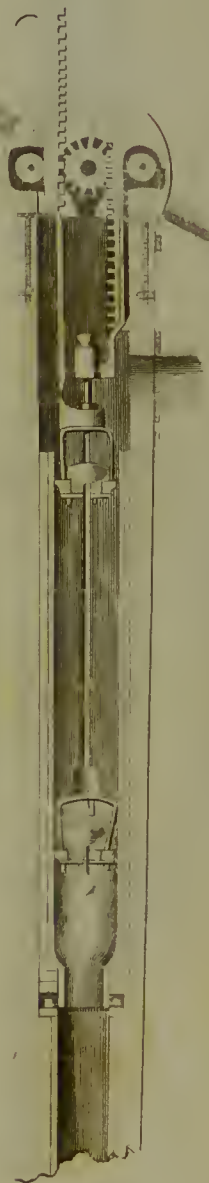


Fig. 8.



Fig. 10.



Fig. 9.

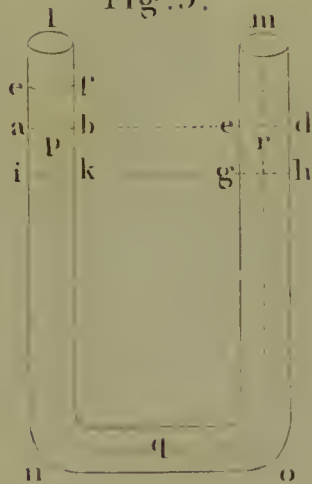
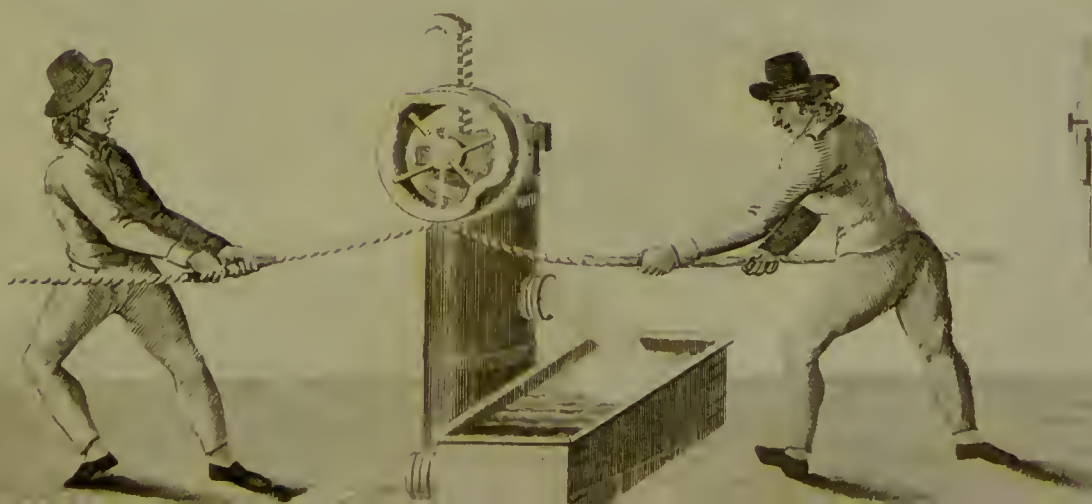


Fig. 7.



Fig. 6.



A detailed technical drawing of a mechanical device, likely a printing press component, showing a central vertical assembly with various parts labeled A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, and A through Z. The device features a central vertical shaft or rod, a large horizontal plate or frame, and various adjustment mechanisms and supports.

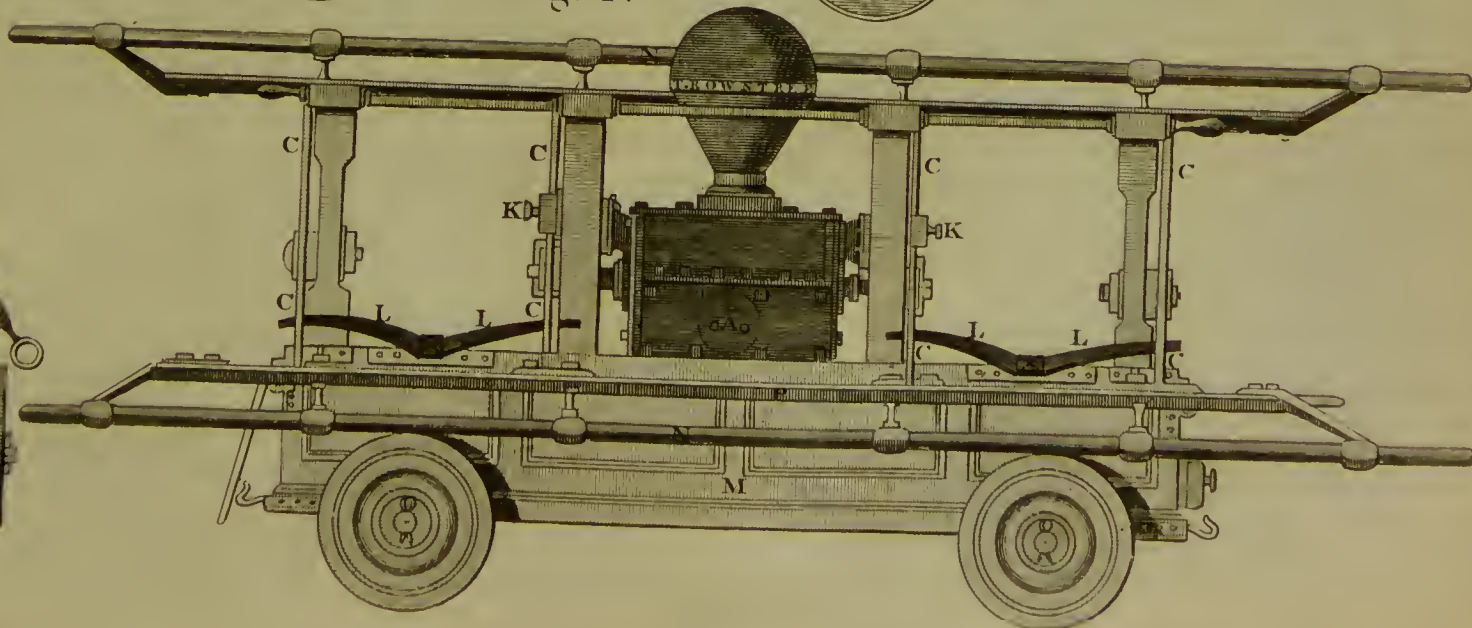
g. 1.

Fig. 3.

Fig. 3.

Fig. 2.

This is a detailed technical drawing of a mechanical clock movement, likely a pendulum clock. The drawing is oriented vertically and shows the internal components of the clock. At the top, there is a circular dial with numbers 1 through 12, and a smaller sub-dial with numbers 1 through 6. The main dial has a hand pointing to approximately 10:10. Below the dial, a large gear (labeled 'a') is connected to a series of smaller gears (labeled 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j', 'k', 'l', 'm', 'n', 'o', 'p', 'q', 'r', 's', 't', 'u', 'v', 'w', 'x', 'y', 'z'). The gears are arranged in a vertical column, with the largest gear at the top and the smallest at the bottom. A pendulum is shown on the right side, with a large weight (labeled 'p') and a frame (labeled 'q'). The pendulum is connected to a series of gears (labeled 'r', 's', 't', 'u', 'v', 'w', 'x', 'y', 'z') that control the movement of the clock. The drawing is labeled with various letters and numbers, including 'a' through 'z' and '1' through '12', indicating specific components and parts. The drawing is a technical illustration, showing the internal mechanism of the clock in a detailed and precise manner.



of the machine. To the three pumps, tubes, or barrels, before mentioned, is to be added a lateral pump, tube, or barrel, of the same bore as the upper and lower pumps, tubes, or barrels, and to communicate with them by a junction at each end. One end is to open into the lower pump, tube, or barrel, just above the stroke of the bucket which draws the water from below, and the other end is to open into the upper pump, tube, or barrel, just above the stroke of the moveable tube before mentioned; by which means the water drawn at every stroke of the machine, from the lower pump, tube, or barrel, through the lateral pump, tube, or barrel, is carried into the pumps, tubes, or barrels, that may be added above, to discharge the water to any height. But, in order to procure the counterbalance of water which is the object of this invention, or of weights equal thereto, to act with the advantage of the hydrostatic paradox, or by any means to assist the lift of the pump by a counterbalance of the water contained therein, there must be a horizontal tube of communication between the said middle pump, tube, or barrel, and another upright pump, tube, or barrel, of the same

dimensions and bore as the middle pump, tube, or barrel, before mentioned; and such upright pump, tube, or barrel, is also to be connected with other pipes, &c. in like manner as before described, when the machinery is to be worked by double pumps, which in deep mines may be the most effectual manner of working; but, if by single pumps, weights must be added on the surface of the water in the upright pump, tube, or barrel, joined as before mentioned, till they shall balance the whole column of the water, in like manner as if pumps, tubes, or barrels, were carried to a level of the other pumps, tubes, or barrels, to form the machinery of working with double pumps. In constructing the double pumps, there may be a horizontal tube of communication between the two upper pumps, tubes, or barrels, a little above the highest ascent of the movable middle tube in each pump."

We shall take leave of our subject by apprising the reader, that such hydraulic and hydrostatic inventions as are not noticed here will be described under their several articles.

H Y G

HYDROTHORAX, a collection of water in the breast. See MEDICINE.

HYDRUNTUM, in ancient geography, a noble and commodious port of Calabria, from which there was a shorter passage to Apollonia (Pliny). Famous for its antiquity, and for the fidelity and bravery of its inhabitants. Now Otranto, a city of Naples, at the entrance of the gulph of Venice. E. lon. 19. 15. N. lat. 40. 12.

HYEMANTES, in the primitive church, offenders who had been guilty of such enormities, that they were not allowed to enter the porch of the churches with the other penitents, but were obliged to stand without, exposed to all the inclemency of the weather.

HYGEIA, in mythology. See HEALTH.

HYGIEINE, Ὑγιεινή, formed of ὑγιής, "sound, healthy," that branch of medicine which considers health, and discovers proper means and remedies, with their use, in the preservation of that state. The objects of this branch of medicine are, the non-naturals. See DIET, EXERCISE, &c. The term Hygieine, more largely taken, is divided into three parts; prophylactice, which foresees and prevents diseases; syneritice, employed in preserving health; and analeptice, whose office is to cure diseases, and restore health.

HYGINUS (CAIUS JULIUS), a grammarian, the freedman of Augustus, and the friend of Ovid, was born in Spain, or, according to others, in Alexandria. He wrote many books which are mentioned by ancient authors; all of which are lost, except some fables, and a work entitled *Astronomicon Poeticon*; and even these are come down to us very imperfect. The best edition of these remains is that of Munkler, published with some other pieces of antiquity in 2 vols. 8vo. 1681, under the title of *Mythographi Latini*.

HYGROMETER, or HYGROSCOPE, or NOTIOMETER, an instrument for measuring the degrees of moisture in the air. There are various kinds of Hygrometers; for whatever body either swells by moisture, or shrinks by dryness, is capable of being formed into an Hygrometer. Such are woods of moist kinds, particularly deal, ash, poplar, &c. Such also is catgut, the beard of a wild oat, and twisted cord, &c. The best and most usual contrivances for this purpose are as follow:

1. Stretch a common cord, or a fiddle-string, ABD (pl. 12, fig. 1.) along a wall, passing it over a pulley B; fixing it at one end A, and to the other end hanging a weight E, carrying a

style or index F. Against the same wall fit a plate of metal HI, graduated, or divided into any number of equal parts; and the Hygrometer is complete.

For it is matter of constant observation, that moisture sensibly shortens cords and strings; and that, as the moisture evaporates, they return to their former length again. The like may be said of a fiddle-string: and from hence it happens that such strings are apt to break in damp weather, if they are not slackened by the screws of the violin. Hence it follows, that the weight E will ascend when the air is more moist, and descend again when it becomes drier. By which means the index F will be carried up and down, and, by pointing to the several divisions on the scale, will shew the degrees of moisture or dryness.

2. Or, for a more sensible and accurate Hygrometer; strain a whipcord, or catgut, over several pulleys B, C, D, E, F, fig. 2. and proceed as before for the rest of the construction. Nor does it matter whether the several parts of the cord be parallel to the horizon, as expressed in the annexed figure, or perpendicular to the same, or in any other position; the advantage of this over the former method being merely the having a greater length of cord in the same compass; for the longer the cord, the greater is the contraction and dilatation, and consequently the degrees of variation of the index over the scale, for any given change of moisture in the air.

3. Or you may fasten a twisted cord, or fiddle string, AB, fig. 3, by one end at A, sustaining a weight at B, carrying an index C round a circular scale DE described on a horizontal board or table. For a cord or catgut twists itself as it moistens, and untwists again as it dries. Hence, upon an increase or decrease of the humidity of the air, the index will shew the quantity of twisting or untwisting, and consequently the increase or decrease of moisture or dryness.

4. Those Dutch toys, called weather houses, where a small image of a man, and one of a woman, are fixed upon the ends of an index, are constructed upon this principle. For the index, being sustained by a cord or twisted catgut, turns backwards and forwards, bringing out the man in wet weather, and the woman in dry.

5. Fasten one end of a cord, or catgut, AB, fig. 4, to a hook at A; and to the other end a ball D of about one pound weight; upon which draw two concentric circles, and divide them into any number of equal parts, for a scale; then fit a style or index EC into a proper support at E, so as the extremity C may al-

most touch the divisions of the ball.—Here the cord twisting or untwisting, as in the former case, will indicate the change of moisture, by the successive application of the divisions of the circular scale, as the ball turns round, to the index C.

6. Or an Hygrometer may be made of the thin boards of ash or fir, by their swelling or contracting. But this, and all the other kinds of this instrument, above described, become in time sensibly less and less accurate; till at last they lose their effect entirely, and suffer no alteration from the weather. But the following sort is much more durable, serving for many years with tolerable accuracy. To the extremity of the balance, fig. 5, fix at E a sponge, or other body, that easily imbibes moisture. To prepare the sponge, it may be proper first to wash it in water very clean; and, when dry again, in water or vinegar in which there has been dissolved sal ammoniac, or salt of tartar; after which let it dry again.—Now, if the air become moist, the sponge will imbibe it and grow heavier, and consequently will preponderate, and turn the index towards C; on the contrary, when the air becomes drier, the sponge becomes lighter, and the index turns towards A; thus shewing the state of the air.

7. In the last-mentioned Hygrometer, Mr. Gould, in the *Philos. Transf.* instead of a sponge, recommends oil of vitriol, which grows sensibly lighter or heavier from the degrees of moisture in the air; so that being saturated in the moistest weather, if afterwards retains or loses its acquired weight, as the air proves more or less moist. The alteration in this liquor is so great, that in the space of 57 days it has been known to change its weight from 3 drachms to 9; and has shifted a tongue or index of a balance 30 degrees. So that in this way a pair of scales may afford a very nice Hygrometer. The same author suggests, that oil of sulphur or campanum, or oil of tartar per deliquium, or the liquor of fixed nitre, might be used instead of the oil of vitriol.

This balance may be contrived in two ways; by either having the pin in the middle of the beam, with a slender tongue a foot and a half long, pointing to the divisions on an arched plate, as represented in the last figure above. Or the scale with the liquor may be hung to the point of the beam near the pin, and the other extremity made so long, as to describe a large arch on a board placed for the purpose; as in 6.

8. Mr. Arderon has proposed some improvement in the Sponge Hygrometer. He directs the sponge A (fig. 7.) to be so cut, as to contain as large a superficies as possible, and to hang by a fine thread of silk upon the beam of a balance B, and exactly balanced on the other side by another thread of silk at D, strung with the smallest lead shot, at equal distances, so adjusted as to cause an index E to point at G, the middle of a graduated arch FGH, when the air is in a middle state between the greatest moisture and the greatest dryness. Under this silk so strung with shot, is placed a little table or shelf I, for that part of the silk or shot to rest upon which is not suspended. When the moisture imbibed by the sponge increases its weight, it will raise the index, with part of the shot, from the table, and vice versa when the air is dry. *Philos. Transf.* vol. 44, p. 96.

9. From a series of Hygroscopical observations, made with an apparatus of deal wood, described in the *Philos. Transf.* number 480, Mr. Coniers concludes, 1st, that the wood shrinks most in summer, and swells most in winter, but is most liable to change in the spring and fall. 2d, That this motion happens chiefly in the day time, there being scarce any variation in the night. 3d, That there is a motion even in dry weather, the wood swelling in the morning, and shrinking in the afternoon. 4th, That the wood, by night as well as by day, usually shrinks when the wind is in the north, north-east, and east, both in summer and winter. 5th, That by constant observation of the motion and rest of the wood, with the help of a thermometer, the direction of the wind may be told nearly without a weather-

cock. He adds, that even the time of the year may be known by it; for in spring it moves more and quicker than in winter; in summer it is more shrunk than in spring; and has less motion in autumn than in summer. See an account of a method of constructing these and other Hygrometers, in *Phil. Transf. Abr.* vol. 2, p. 30, &c. and plate 1 annexed. See also *Philos. Transf.* vol. 11, p. 647 and 715; vol. 15, p. 1032; vol. 43, p. 6; vol. 44, p. 95, 169 and 184; vol. 54, p. 252; vol. 61, p. 198; vol. 63, p. 404, &c.

10. The Doctors Hales and Desaguliers both contrived another form of Sponge Hygrometer, on this principle. They made an horizontal axis, having a small part of its length cylindrical, and the remainder tapering conically with a spiral thread cut in it, after the manner of the fusee of a watch. See fig. 8. The sponge is suspended by a fine silk thread to the cylindrical part of the axis, upon which it winds. This is balanced by a small weight W, suspended also by a thread, which winds upon the spiral fusee. Then when the sponge grows heavier, in moist weather, it descends and turns the axis, and so draws up the weight; which coming to a thicker part of the axis it becomes a balance to the sponge, and its motion is shewn by an attached scale. And vice versa when the air becomes drier.—Salt of tartar, or any other salt, or pot-ashes, may be put into the scale of a balance, and used instead of the sponge. *Desag. Exper. Philos.* vol. 2, p. 300.

11. Mr. Ferguson made an Hygrometer of a thin deal pannel; and to enlarge the scale, and so render its variations more sensible, he employed a wheel and axle, making one cord pass over the axle, which turned a wheel ten times as large, over which passed a line with a weight at the end of it, whose motion was therefore ten times as much as that of the deal pannel. The board should be changed in 3 or 4 years. See *Philos. Transf.* vol. 54, art. 47.

12. Mr. Smeaton gave also an ingenious and elaborate construction of an Hygrometer; which may be seen in the *Philos. Transf.* vol. 61, art. 24.

13. Mr. De Luc's contrivance for an Hygrometer is very ingenious, and on this principle. Finding that even ivory swells with moisture, and contracts with dryness, he made a small and very thin hollow cylinder of ivory, open only at the upper end, into which is fitted the under or open end of a very fine long glass tube, like that of a thermometer. Into these is introduced some quicksilver, filling the ivory cylinder, and a small part of the length up the glass tube. The consequence is this: When moisture swells the ivory cylinder, its bore or capacity grows larger, and consequently the mercury sinks in the fine glass tube; and vice versa, when the air is drier, the ivory contracts, and forces the mercury higher up the tube of glass. It is evident that an instrument thus constructed is in fact also a thermometer, and must necessarily be affected by the vicissitudes of heat and cold, as well as by those of dryness and moisture; or that it must act as a thermometer as well as an Hygrometer. The ingenious contrivances in the structure and mounting of this instrument may be seen in the *Philos. Transf.* vol. 63, art. 38; where it may be seen how the above imperfection is corrected by some simple and ingenious expedients, employed in the original construction and subsequent use of the instrument; in consequence of which, the variations in the temperature of the air, though they produce their full effects on the instrument, as a thermometer, do not interfere with or embarrass its indications as an Hygrometer.

14. In the *Philos. Transf.* for 1791, Mr. De Luc has given a second paper on Hygrometry. This has been chiefly occasioned by a Memoir of M. De Saussure on the same subject, entitled *Essais sur l'Hygrometrie*, in 4to, 1783. In this work M. De Saussure describes a new Hygrometer of his construction, on the following principle. It is a known fact that a hair will stretch when it is moistened, and contract when dried: and M. De Saussure

found, by repeated experiments, that the difference between the greatest extension and contraction, when the hair is properly prepared, and has a weight of about 3 grains suspended by it, is nearly one 40th of its whole length, or one inch in 40. This circumstance suggested the idea of a new Hygrometer. To render these small variations of the length of the hair perceptible, an apparatus was contrived, in which one of the extremities of the hair is fixed, and the other, bearing the counterpoise abovementioned, surrounds the circumference of a cylinder, which turns upon an axis to which a hand is adapted, marking upon a dial in large divisions the almost insensible motion of this axis. About 12 inches high is recommended as the most convenient and useful: and to render them portable, a contrivance is added, by which the hand and the counterpoise can be occasionally fixed.

But M. De Luc, in his *Idées sur la Meteorologie*, vol. 1, anno 1786, shews that hairs, and all the other animal or vegetable hygroscopic substances, taken lengthwise, or in the direction of their fibres, undergo contrary changes from different variations of humidity; that when immersed in water, they lengthen at first, and afterwards shorten; that when they are near the greatest degree of humidity, if the moisture be increased, they shorten themselves; if it be diminished, they lengthen themselves first before they contract again. These irregularities, which render them incapable of being true measures of humidity, he shews to be the necessary consequence of their organic reticular structure. De Saussure takes his point of extreme moisture from the vapours of water under a glass bell, keeping the sides of the bell continually moistened; and affirms, that the humidity is, there, constantly the same in all temperatures; the vapours even of boiling water having no other effect than those of cold. De Luc, on the contrary, shews that the differences in humidity under the bell are very great, though De Saussure's Hygrometer was not capable of discovering them; and that the real undecomposed vapour of boiling water has the directly opposite effect to that of cold, the effect of extreme dryness; and on this point he mentions an interesting fact, communicated to him by Mr. Watt, viz. that wood cannot be employed in the steam engine, for any of those parts where the vapour of the boiling water is confined, because it dries so as to crack as if exposed to the fire.

To these charges of M. De Luc, a reply is made by M. De Saussure, in his *Defence of the Hair Hygrometer*, in 1788; where he attributes the general disagreement between the two instruments, to irregularities of M. De Luc's; and assigns some aberrations of his own Hygrometer, which could not have proceeded from the above cause, but to its having been out of order; &c.

This has drawn from M. De Luc a second paper on Hygrometry, published in the *Philos. Trans.* for 1791, p. 1, and 389. This author here resumes the four fundamental principles which he had sketched out in the former paper, viz. 1st, That fire is a sure, and the only sure means of obtaining extreme dryness. 2d, That water, in its liquid state, is a sure, and the only sure means of determining the point of extreme moisture. 3d, There is no reason, a priori, to expect, from any hygroscopic substance, that the measurable effects, produced in it by moisture, are proportional to the intensities of that cause. — But, 4th, perhaps the comparative changes of the dimensions of a substance, and of the weight of the same or other substances, by the same variations of moisture, may lead to some discovery in that respect. On these heads M. De Luc expatiates at large in this paper, shewing the imperfections of M. De Saussure's principles of Hygrometry, and particularly as to a hair, or any such substance when extended lengthwise, being properly used as an Hygrometer. On the other hand, he shews that the expansion of substances across the fibres, or grain, renders them, in that respect, by far the most proper for this purpose. He chooses such as can be made very thin, as ivory or deal shavings, but over

all he finds whalebone to be far the best of any. But, for all the reasonings of these ingenious philosophers on this interesting subject, and complete information, see the publications above quoted, as also the *Monthly Review*, vol. 51, p. 224; vol. 71, p. 213; vol. 76, p. 316; vol. 78, p. 236; and vol. 6, of the new series for the year 1791, p. 133.

We shall conclude this article with the following description of M. De Saussure's original Hygrometer. In the plate there is a representation of the whole instrument, with the hair and other appendages complete. The lower extremity of the hair *a b* is held by the chaps of the screw pincers *b*. These pincers are represented more distinctly at B: by a screw at its end, it fastens into the nut of the bottom plate C. This nut of the plate turns independently of the piece that supports it, and serves to raise or depress the pincers B at pleasure.

The upper extremity *a* of the hair is held by the under chaps of the double pincers *a*, represented aside at A. These pincers fasten the hair below, and above fasten a very fine narrow slip of silver, carefully annealed, which rolls round the arbor or cylinder *d*, a separate figure of which is shown at DF. This arbor, which carries the needle or index *e e*, or E in the separate figure, is cut in the shape of a screw; and the intervals of the threads of this screw have their bases flat, and are cut squarely so as to receive the slip of silver that is fastened to the pincers *a*, and joined in this manner with the hair. M. De Saussure observes, that hair alone fixed immediately to the arbor would not do; for it curled upon it, and acquired a stiffness that the counterpoise was not able to surmount. The arbor was cut in a screw form, in order that the slip of silver in winding upon it should not increase the diameter of the arbor, and never take a situation too oblique and variable. The slip is fixed to the arbor by a small pin F. The other extremity of the arbor D is shaped like a pulley, flat at the bottom so as to receive a fine supple silken string, to which is suspended the counterpoise *g* in the large figure, and G in the side one. This counterpoise is applied to distend the hair; and acts in a contrary direction to that of the hair, and the moveable pincers to which the hair is fixed. If then the hair should be loaded with the weight of four grains, the counterpoise must weigh four grains more than the pincers. The arbor at one end passes through the centre of the dial, and turns therein, in a very fine hole, on a pivot made very cylindrical and well polished: at the other end is also a similar pivot, which turns in a hole made in the end of the arm *b* of the cock *b i*, H.I. This cock is fixed behind the dial by means of the screw I.

The dial *k e e k*, divided into 360 degrees, is supported by two arms *ll*; these are soldered to two tubes, which inclose the cylindrical columns *m m m m*. The setting screws *n n* move upon these tubes, and serve thereby to fix the dial and arbor to any height required. The two columns which support the dial are firmly fastened to the case of the hygrometer, which rests upon the four screws *o o o o*; by the assistance of these screws, the instrument is adjusted, and placed in a vertical situation.

The square column *p p*, which rests upon the base of the hygrometer, carries a box *q*, to which is fixed a kind of port-crayon *r*, the aperture of which is equal to the diameter of the counterpoise *g*. When the hygrometer is to be moved from one place to another; to prevent a derangement of the instrument from the oscillations of the counterpoise, the box *q*, and the port-crayon *r*, must be raised up so as the counterpoise may fall into and be fixed in it, by tightening the screw *s*, and the box and counterpoise together by the screw *t*. When the hygrometer is intended for use, the counterpoise must be disengaged by lowering the box, as may be conceived from the figure.

Lastly, at the top of the instrument is a curved piece of metal *x, y, z*, which is fastened to the three columns just described, and keeps them together. It has a square hole at *y*, which serves to hang up the hygrometer by when required.

The variations of which this hygrometer is capable, are (all things besides equal) as much greater as the arbor round which the slip of silver winds is than a smaller diameter, and as the instrument is capable of receiving a longer hair. M. Saussure has had hygrometers made with hairs 14 inches long, but he finds one foot sufficient. The arbor is three-fourths of a line in diameter at the base between the threads of the screw or the part on which the slip winds. The variations, when a hair properly prepared is applied to it, are more than an entire circumference, the index describing about 400 degrees in moving from extreme dryness to extreme humidity. M. Saussure mentions an inconvenience attending this hygrometer, *viz.* its not returning to the same point when moved from one place to another; because the weight of three grains that keeps the silver slip extended, cannot play so exactly as to act always with the same precision against the arbor round which it winds. But this weight cannot be sensibly increased without still greater inconveniences: he therefore observes, that this hygrometer is well calculated for a fixed situation in an observatory, and for various hygrometrical experiments; since, instead of the hair, there may be substituted any other substance of which a trial may be wanted; and it may be kept extended by a counterpoise more or less heavy as they may require: but the instrument will not admit of being moved, nor serve even for experiments which may subject it to agitation.

To obviate this objection, M. Saussure has contrived another apparatus more portable and convenient, and which, if not so extensive in its variations, is in fact very firm, and not in the least liable to be deranged by carriage and agitation.

This hygrometer he calls the *portable hygrometer*, in distinction from the preceding, which he calls the *great hygrometer*, or the *hygrometer with the arbor*. Both these instruments are accurately made by Mr. W. Jones, in Holborn.

HYGROSCOPE. The same with **HYGROMETER**.

HYLA, in ancient geography, a river of Mysia Minor, famous for Hylas the favourite boy of Hercules, who was carried down the stream and drowned. It is said to run by Prusa; whence it seems to be the same with the *Rhyndacus*, which runs north-west into the Propontis.

HYLAS, in fabulous history, son of Theodamus, was ravished by the nymphs of a fountain as he was taking out some water for Hercules, by whom he was beloved.

HYLOZOISTS, formed of *ὕλη* *matter*, and *ζωή* *life*, the name of a sect of atheists among the ancient Greek philosophers, who held matter to be animated; maintaining that matter had some natural perception, without animal sensation, or reflection in itself considered; but that this imperfect life occasioned that organization whence sensation and reflection afterwards arose. Of these, some held only one life, which they called a **PLASTIC** nature, presiding regularly and invariably over the whole corporeal universe, which they represented as a kind of large plant or vegetable: these were called the *cosmoplastic* and *stoical* atheists, because the Stoics held such a nature, though many of them supposed it to be the instrument of the Deity. Others thought that every particle of matter was endued with life, and made the mundane system to depend upon a certain mixture of chance and plastic or orderly nature united together. These were called the *Stratonici*, from Strato Lampfacenus, a disciple of Theophrastus, called also *Physicus*, (Cicero, *De Nat. Deor.* lib. 1. cap. 13.) who was first a celebrated Peripatetic, and afterwards formed this new system of atheism for himself. Besides these two forms of atheism, some of the ancient philosophers were *Hylopathians*, or **ANAXIMANDRIANS**, deriving all things from dead and stupid matter, in the way of qualities and forms, generable and corruptible; and others again adopted the **ATOMICAL** or *Democritical* system, who ascribe the production of the universe to atoms and figures. This subject is treated in *Cudworth's Intellectual System*, book i. chap. 3.

HYMEN, or **HYMENÆUS**, a fabulous divinity, the son of Bacchus and Venus Urania, was supposed by the ancients to preside over marriages; and accordingly was invoked in epithalamiums, and other matrimonial ceremonies, under the formula, *Hymen, or Hymenæe!* The poets generally crown this deity with a chaplet of roses; and represent him, as it were, dissolved and enervated with pleasures; dressed in a yellow robe, and shoes of the same colour; with a torch in his hand.—Catullus, in one of his epigrams, addresses him thus:

*Cinge tempora floribus
Suavolentis amara.*

It was for this reason that the new-married couple bore garlands of flowers on the wedding-day: which custom all obtained among the Hebrews, and even among Christians during the first ages of the church, as appears from Tertullian *De corona militari*, where he says, *Coronant & nuptæ sponsores*.—S. Chrysostom likewise mentions these crowns of flowers; and to this day the Greeks call marriage *ἑσφαισμός*, in respect of this crown or garland.

HYMEN, *ἤμην*, in anatomy, a thin membrane or skin, sometimes circular, of different breadths, more or less smooth, and sometimes semilunar, formed by the union of the internal membrane of the vagina with that on the inside of the alæ, resembling a piece of fine white leather somewhat corrugated. This membrane stretches below the nymphæ, leaving in some subjects a very small opening, in others a larger, and in all rendering the external orifice narrower than the rest of the cavity, and to be broke when they are deflowered; an effusion of blood following the breach.

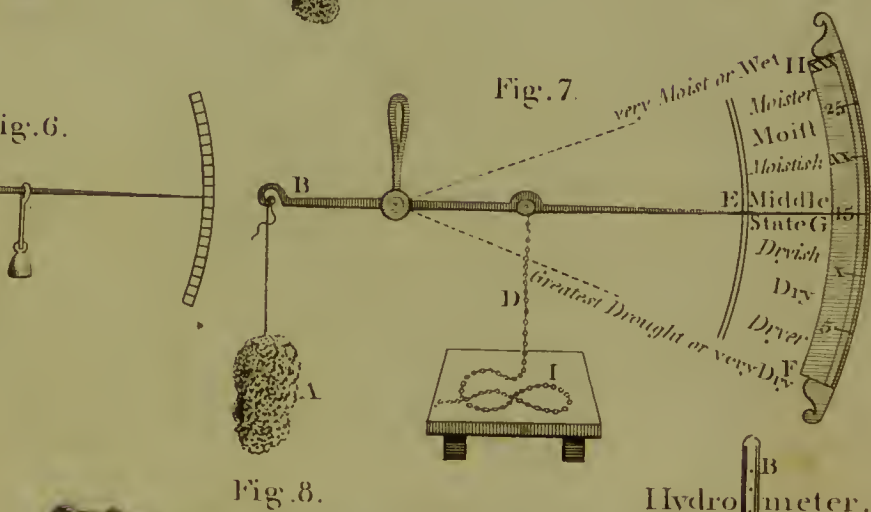
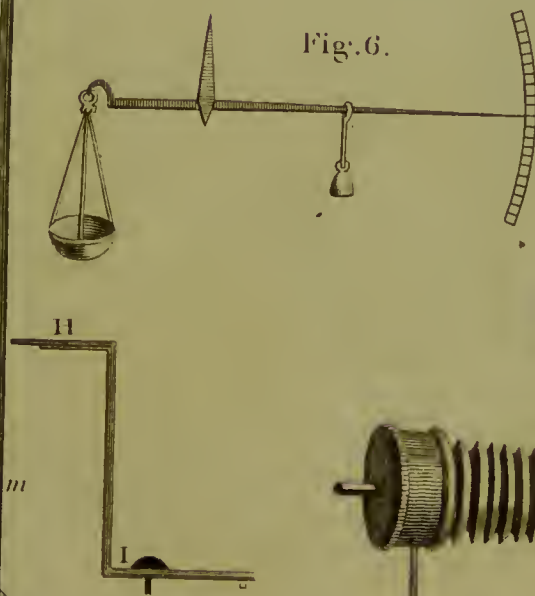
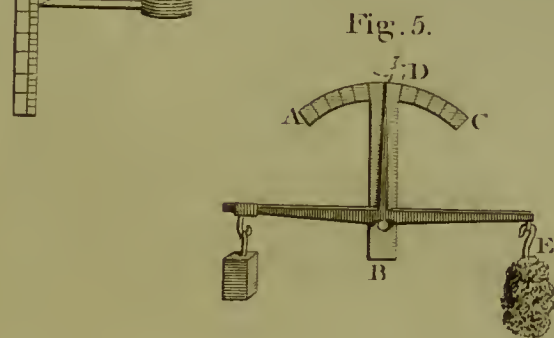
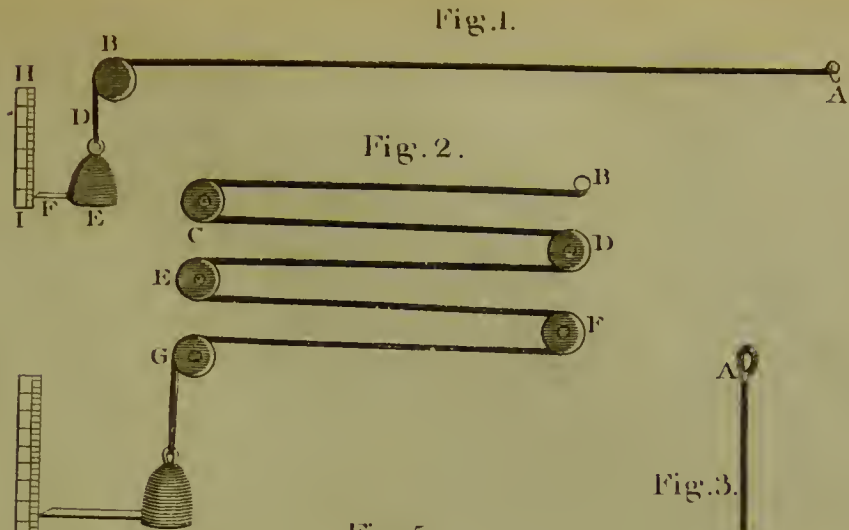
This membranous circle may be ruptured by imprudent digital contact, and other accidents. The hymen is justly looked upon as the test of virginity; and when broke, or withdrawn, shows that the person is not in a state of innocence. This notion is very ancient. Among the Hebrews, it was the custom for the parents to have the blood shed on this occasion as a token of the virginity of their daughter, and to send the sheets next day to the husband's relations. And the like is said to be still practised in Portugal and some other countries.

And yet so various are the natural or accidental appearances of this part, that authors were not till of late years agreed as to the existence of such a membrane. De Graaf himself, the most accurate inquirer into the structure of these organs, confesses that all he could find was, a different degree of straitness or wideness, and different corrugations, which were greater or less according to the respective ages; the aperture being still the less, and the rugosities the greater, as the subject was younger and more untouched. Modern anatomists, however, have put the natural existence of this part beyond all question. In infants, indeed, it is a fine thin membrane, not very conspicuous, because of the natural straitness of the passage itself, which does not admit of any great expansion in so little room; and this might have led De Graaf into the mistake of its being no more than a corrugation.

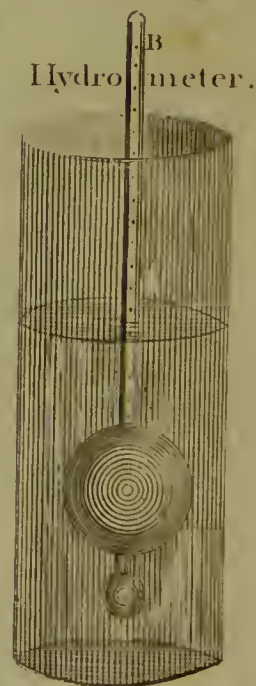
Mr. Cowper relates the case of a married woman, twenty years of age, whose hymen was found altogether impervious, so as to detain the menses, and to be driven out by the pressure thereof beyond the labia of the pudendum, not unlike a prolapsus of the uterus. On dividing it, a prodigious quantity of grumous blood came forth. It seems the husband, being denied a passage that way, had found another through the meatus urinaris; which was found very open, and its sides extruded like the anus of a cock.

Upon a rupture of the hymen, after the consummation of marriage, and especially after delivery, its parts shrinking up form those little ragged fleshy fragments called *caruncule myrtiformes*.

HYMENÆA, the **BASTARD LOCUST TREE**; a genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 33d order, *Lomentaceæ*.



HYSTRIX.



The calyx is quinquepartite; there are five petals, nearly equal; the style is intorted; the legumen full of mealy pulp. There is but one species, the courbaril, which is a large tree growing naturally in the Spanish West Indies. The trunk is covered with a light ash-coloured bark, is often more than 60 feet high, and three in diameter. The branches are furnished with dark green leaves, which stand by pairs on one common foot-stalk, diverging from their base in manner of a pair of shears when opened. The flowers come out in loose spikes at the ends of the branches, and are yellow striped with purple. Each consists of five petals, placed in a double calyx, the outer leaf of which is divided into five parts, and the inner one is cut into five teeth at its brim. In the centre are ten declining stamina, longer than the petals, surrounding an oblong germen, which becomes a thick, fleshy, brown pod, four or five inches long and one broad, with a suture on both edges, and includes three or four purplish seeds, somewhat of the shape of Windsor beans, but smaller. The seeds are covered with a light brown sugary substance, which the Indians scrape off and eat with great avidity, and which is very pleasant and agreeable.—At the principal roots under ground, is found collected in large lumps a yellowish red transparent gum, which dissolved in rectified spirit of wine affords a most excellent varnish, and is the gum anime of the shops.

HYMENOPTERA, derived from *ὑμην* membrane, and *πτερον* wing, in the Linnæan system of natural history, is an order of insects having four membranaceous wings, and the tails of the females are furnished with stings, which in some are used for infilling poison, and in others for merely piercing the bark and leaves of trees, and the bodies of other animals, in which they deposit their eggs.

HYMETTUS, in ancient geography, a mountain of Attica near Athens, famous for its marble quarries, and for its excellent honey. *Hymettius* is the epithet. Pliny says that the orator Crassus was the first who had marble columns from this place.

HYMN, a song or ode in honour of God; or a poem, proper to be sung, composed in honour of some deity. The word is Greek, *ὑμνος* *hymn*, formed of the verb *ὑδω* *celebro*, "I celebrate." Isidore, on this word, remarks, that *hymn* is properly a song of joy, full of the praises of God: by which, according to him, it is distinguished from *threnia*, which is a mourning song, full of lamentation. St. Hilary, bishop of Poitiers, is said to have been the first that composed hymns to be sung in churches, and was followed by St. Ambrose. Most of those in the Roman Breviary were composed by Prudentius. They have been translated into French verse by Messieurs de Port Royal. In the Greek Liturgy there are four kinds of hymns; but the word is not taken in the sense of a praise offered in verse, but simply of a laud or praise. The angelic hymn, or *Gloria in excelsis*, makes the first kind; the *trifagion*, the second; the *cherubic hymn*, the third; and the hymn of victory and triumph, called *ἐπὶ νίκῃ*, the last. The hymns or odes of the ancients generally consisted of three sorts of stanzas; one of which, called *strophè*, was sung by the band as they walked from east to west; another, called *antistrophè*, was performed as they returned from west to east; the third part, or *epode*, was sung before the altar. The Jewish hymns were accompanied with trumpets, drums, and cymbals, to assist the voices of the Levites and people.

HYOBANCHE, in botany, a genus of the angiospermia order, belonging to the didynamia class of plants. The calyx is heptaphyllous; the corolla ringent, with no under lip. The capsule bilocular, and polyspermous.

HYOIDES, in anatomy, a bone placed at the root of the tongue. See ANATOMY, page 213.

HYOSCYAMUS, HENBANE; a genus of the monogynia

order, belonging to the pentandria class of plants; and in the natural method ranking under the 28th order, *Lurideæ*. The corolla is funnel-shaped and obtuse; the stamina inclining to one side; the capsule covered and bilocular. There are several species, one of which, *viz.* the niger, or common henbane, is a native of Britain. It grows on road sides, and among rubbish. It is a biennial plant, with long fleshy roots which strike deep into the ground, sending out several large soft leaves, deeply slashed on their edges: the following spring the stalks come up, which are about two feet high, garnished with flowers standing on one side in a double row, sitting close to the stalks alternately. They are of a dark purplish colour, with a black bottom; and are succeeded by roundish capsules which open with a lid at the top, and have two cells filled with small irregular seeds. The seeds, leaves, and roots of this plant, as well as of all other species of this genus, are poisonous: and many well attested instances of the bad effects are recorded; madness, convulsions, and death, being the common consequence. In a smaller dose they occasion giddiness and stupor. It is said that the leaves scattered about a house will drive away mice. The juice of the plant evaporated to an extract is prescribed in some cases as a narcotic; in which respect undoubtedly it may be a powerful medicine if properly managed. The dose is from half a scruple to half a dram. The roots are used for anodyne necklaces. Goats are not fond of the plant; horses, cows, sheep, and swine, refuse it.

HYOSERIS, in botany; a genus of the polygamia æqualis order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked, the calyx nearly equal; the pappus hairy, or scarce perceptible.

HYO-THYROIDES, in anatomy, one of the muscles belonging to the os hyoides. See ANATOMY, *Table of the Muscles*.

HYPALLAGE, among grammarians, a species of hyperbaton, consisting in a mutual permutation of one case for another. Thus Virgil says, *Dare classibus austros*, for *dare classes austris*; and again, *Needum illis labra admovi*, for *needum illa labris admovi*.

HYPANTE, or HYPERPANTE, a name given by the Greeks to the feast of the presentation of Jesus in the temple. This word, which signifies *lowly* or *humble meeting*, was given to this feast from the meeting of old Simeon and Anna the prophets in the temple when Jesus was brought thither.

HYPATIA, a learned and beautiful lady of antiquity, the daughter of Theon a celebrated philosopher and mathematician, and president of the famous Alexandrian school, was born at Alexandria about the end of the fourth century. Her father, encouraged by her extraordinary genius, had her not only educated in all the ordinary qualifications of her sex, but instructed in the most abstruse sciences. She made such great progress in philosophy, geometry, astronomy, and the mathematics, that she passed for the most learned person of her time. At length she was thought worthy to succeed her father in that distinguished and important employment, the government of the school of Alexandria, and to teach out of that chair where Ammonius, Hierocles, and many other great men had taught before; and this at a time too when men of great learning abounded both at Alexandria and in many other parts of the Roman empire. Her fame was so extensive, and her worth so universally acknowledged, that we cannot wonder if she had a crowded auditory. "She explained to her hearers (says Socrates) the several sciences that go under the general name of philosophy; for which reason there was a confluence to her, from all parts, of those who made philosophy their delight and study." One cannot represent to himself without pleasure, the flower of all the youth of Europe, Asia, and Africa, sitting at the

feet of a very beautiful lady (for such we are assured Hypatia was), all greedily swallowing instruction from her mouth, and many of them, doubtless, love from her eyes; though we are not sure that she ever listened to any solicitations, since Suidas, who talks of her marriage with Isidorus, yet relates at the same time that she died a maid.

Her scholars were as eminent as they were numerous; one of whom was the celebrated Synesius, who was afterwards bishop of Ptolemais. This ancient Christian Platonist every where bears the strongest as well as the most grateful testimony to the virtue of his tutors; and never mentions her without the most profound respect, and sometimes in terms of affection coming little short of adoration. But it was not Synesius only, and the disciples of the Alexandrian school, who admired Hypatia for her virtue and learning: never was woman more caressed by the public, and yet never woman had a more unspotted character. She was held as an oracle for her wisdom, which made her consulted by the magistrates in all important cases; and this frequently drew her amongst the greatest concourse of men, without the least censure of her manners. In a word, when Nicephorus intended to pass the highest compliment on the princess Eudocia, he thought he could not do it better than by calling her another *Hypatia*.

While Hypatia thus reigned the brightest ornament of Alexandria, Orestes was governor of the same place for the emperor Theodosius, and Cyril was bishop or patriarch. Orestes, having had a liberal education, could not but admire Hypatia; and as a wise governor frequently consulted her. This, together with an aversion which Cyril had against Orestes, proved fatal to the lady. About 500 monks assembling, attacked the governor one day, and would have killed him, had he not been rescued by the townsmen; and the respect which Orestes had for Hypatia causing her to be traduced among the Christian multitude, they dragged her from her chair, tore her to pieces, and burned her limbs. Cyril is not clear from a suspicion of fomenting this tragedy. Cave indeed endeavours to remove the imputation of such an horrid action from the patriarch; and lays it upon the Alexandrian mob in general, whom he calls *levissimum hominum genus*, "a very trifling inconstant people." But though Cyril should be allowed neither to have been the perpetrator nor even the contriver of it, yet it is much to be suspected that he did not discountenance it in the manner he ought to have done: which suspicion must needs be greatly confirmed by reflecting, that he was so far from blaming the outrage committed by the monks upon Orestes, that he afterwards received the dead body of Ammonius, one of the most forward in that outrage, who had grievously wounded the governor, and who was justly punished with death. Upon this riotous Russian Cyril made a panegyric in the church where he was laid, in which he extolled his courage and constancy, as one that had contended for the truth; and changing his name to *Thaumastias*, or the "Admirable," ordered him to be considered as a martyr. "However (continues Socrates), the wisest part of Christians did not approve the zeal which Cyril showed on this man's behalf, being convinced that Ammonius had justly suffered for his desperate attempt."

HYPECOM, WILD CUMMUN; a genus of the digynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 24th order, *Corydalis*. The calyx is diphyllous; the petals four; the exterior two larger and trifid; the fruit a pod. There are four species, all of them low herbaceous plants with yellow flowers. The juice of these plants is of a yellow colour, resembling that of celandine, and is affirmed by some eminent physicians to be as narcotic as opium. From the nectarium of the blossom the bees collect great quantities of honey. All the species are easily propagated by seeds.

HYPER, a Greek preposition frequently used in composition, where it denotes excess, its literal signification being *above*, or *beyond*.

HYPERBATON, in grammar, a figurative construction inverting the natural and proper order of words and sentences. The several species of the hyperbaton are, the anastrophe, the hysteron-proteron, the hypallage, synchysis, tmesis, parenthesis, and the hyperbaton strictly so called. See *ANASTROPHE*, &c. **HYPERBATON**, strictly so called, is a long retention of the verb which completes the sentence, as in the following example from Virgil:

*Interea reges : ingenti mole Latinus
Quadrijugo vebitur curru, cui tempora circum
Aurati bis sex radii fulgentia cingunt,
Solis avi specimen : bigis it Turnus in albis,
Bina manu lato crispans bastilia ferro.
Hunc Pater Æneas, Romanæ stirpis origo,
Sidereo flagrans clypeo et celsis armis;
Et juxta Ascanius, magnæ spes alera Romæ;
Procedunt castris.*

HYPERBOLA, a curve formed by cutting a cone in a direction parallel to its axis. See *CONIC SECTIONS*.

HYPERBOLE, in rhetoric, a figure, whereby the truth and reality of things are excessively either enlarged or diminished. Lord Kaims observes, that an object uncommon with respect to size, either very great of its kind or very little, strikes us with surprise; and this emotion forces upon the mind a momentary conviction, that the object is greater or less than it is in reality: the same effect precisely attends figurative grandeur or littleness; and hence the hyperbole, which expresses this momentary conviction. A writer, taking advantage of this natural delusion, enriches his description greatly by the hyperbole: and the reader, even in his coolest moments, relishes this figure, being sensible that it is the operation of nature upon a warm fancy.

It cannot have escaped observation, that a writer is generally more successful in magnifying by a hyperbole than in diminishing. The reason is, that a minute object contracts the mind, and fetters its powers of imagination; but that the mind dilated and inflamed with a grand object moulds objects for its gratification with great facility. Longinus, with respect to a diminishing hyperbole, cites the following ludicrous thought from a comic poet: "He was owner of a bit of ground not larger than a Lacedæmonian letter." But, for the reason now given, the hyperbole has by far the greater force in magnifying objects; of which take the following examples:

For all the land which thou see'st, to thee will I give it, and to thy seed for ever. And I will make thy seed as the dust of the earth: so that if a man can number the dust of the earth, then shall thy seed also be numbered.

Gen. xiii. 15, 16.

*Illa vel intactæ segetis per summa volaret
Gramina: nec teneras cursu læsisset aristas.*

Æneid. vii. 308.

———atque imo barathri ter gurgite vastos
Sorbet in abruptum fluctus, rursusque sub auras
Erigit alternos, et sidera verberat undâ.

Æneid. iii. 421.

———horrificis juxta tonat Ætna ruinis,
Interdumque atram prorumpit ad æthera nubem,
Turbine fumantem piceo et candente favilla:
Attollitque globos flammæ, et sidera lambit.

Æneid. iii. 571.

Speaking of Polyphemus,

————— Ipse arduus, altaque pulsat
Sidera. *Æneid.* iii. 619.

————— When he speaks,
The air, a charter'd libertine, is still.
Henry V. act 1. sc. 1.

Now shield with shield, with helmet helmet clos'd,
To armour armour, lance to lance oppos'd,
Host against host with shadowy squadrons drew,
The sounding darts in iron tempests flew,
Victors and vanquish'd join promiscuous cries,
And shrilling shouts and dying groans arise;
With streaming blood the slipp'ry fields are dy'd,
And slaughter'd heroes swell the dreadful tide.
Iliad iv. 508.

Quintilian is sensible that this figure is natural: "For (says he), not contented with truth, we naturally incline to augment or diminish beyond it; and for that reason the hyperbole is familiar even among the vulgar and illiterate:" and he adds, very justly, "That the hyperbole is then proper, when the object of itself exceeds the common measure." From these premises one would not expect the following inference, the only reason he can find for justifying this figure of speech, "Conceditur enim amplius dicere, quia dici quantum est non potest: meliusque ultra quam citra stat oratio." (We are indulged to say more than enough, because we cannot say enough; and it is better to be above than under.) In the name of wonder, why this slight and childish reasoning, when immediately before he had observed, that the hyperbole is founded on human nature? We could not resist this personal stroke of criticism; intended not against our author, for no human creature is exempt from error; but against the blind veneration that is paid to the ancient classic writers, without distinguishing their blemishes from their beauties.

HYPERBOREAN, in the ancient geography. The ancients denominated those people and places *Hyperborean* which were to the northward of the Scythians. They had but very little acquaintance with these Hyperborean regions; and all they tell us of them is very precarious, much of it false. Diodorus Siculus says, the Hyperboreans were thus called by reason they dwelt beyond the wind Boreas; *ὑπερ* signifying "above, or beyond," and *Βορρæας*, *Boreas*, the "north wind." This etymology is very natural and plausible; notwithstanding all that Rudbeck has said against it, who would have the word to be Gothic, and to signify *nobility*. Herodotus doubts whether or no there were any such nations as the Hyperborean. Strabo, who professes that he believes there are, does not take *hyperborean* to signify *beyond Boreas* or the north, as Herodotus understood it: the preposition *ὑπερ*, in this case, he supposes only to help to form a superlative; so that *hyperborean*, on his principle, means no more than *most northern*: by which it appears the ancients scarce knew themselves what the name meant. Most of our modern geographers, as Hoffman, Cellarius, &c. have placed the Hyperboreans in the northern parts of the European continent, among the Siberians and Samoieds: according to them, the Hyperboreans of the ancients were those in general who lived farthest to the north. The Hyperboreans of our days are those Russians who inhabit between the Volga and the White Sea. According to Chuvier, the name Celtes was synonymous with that of Hyperboreans.

HYPERCATALECTIC, in the Greek and Latin poetry, is applied to a verse that has one or two syllables too much, or beyond the regular and just measure; as, *Musæ sorores sunt Minervæ*: Alfo, *Musæ sorores Palladis ingent*.

HYPERCRITIC, an over-rigid censor, or critic: one who will let nothing pass, but animadvert severely on the slightest fault. The word is compounded of *ὑπερ* *super*, "over, above, beyond;" and *κριτικῶς*, of *κρίτης* *judge*, of *κρίνω* *judico*, "I judge."

HYPERDULIA, in the Romish theology, is the worship rendered to the holy virgin. The word is Greek, *ὑπερδουλία*, composed of *ὑπερ* *above*, and *δουλία* *worship, service*. The worship offered to saints is called *dulia*; and that to the mother of God, *hyperdulia*, as being superior to the former.

HYPERIA, in ancient geography, the seat of the Phæacians near the Cyclops (Homer): some commentators take it to be Camarina in Sicily; but, according to others, it is supposed to be an adjoining island, which they take to be Melita, lying in sight of Sicily. And this seems to be confirmed by Apollonius Rhodius. Whence the Phæacians afterwards removed to Corcyra, called *Seberia*, *Phæacia*, and *Maëris*; having been expelled by the Phœnicians, who settled in Melita for commerce, and for commodious harbours, before the war of Troy. (Diodorus Siculus.)

HYPERICUM, **ST. JOHN'S WORT**; a genus of the polyandria order, belonging to the polyadelphia class of plants; and in the natural method ranking under the 20th order, *Rotaceæ*. The calyx is quinquepartite; the petals five; the filaments many, and coalited at the base into five pencils; the seed-vessel is a pencil. Of this genus there are 29 *species*, most of them hardy deciduous shrubs, and under-shrubby plants, adorned with oblong and oval simple foliage, and pentapetalous yellow flowers in clusters. The most remarkable are, 1. The *hircinum*, or stinking St. John's wort. This rises three or four feet high, with several shrubby two-edged stalks from the root, branching by pairs opposite at every joint; oblong, oval, close-fitting opposite leaves; and at the ends of all the young shoots, clusters of yellow flowers. Of this there are three varieties; one with strong stalks, six or eight feet high, broad leaves and large flowers; the other with strong stalks, broad leaves and without any disagreeable odour; the third hath variegated leaves. All these varieties are shrubby; and flower in June and July in such numerous clusters, that the shrubs appear covered with them; and produce abundance of seed in autumn. 2. The *canariensis* hath shrubby stalks, dividing and branching six or seven feet high; oblong, close-fitting leaves by pairs: and, at the ends of the branches, clusters of yellow flowers appearing in June and July. 3. The *ascyron*, or dwarf American St. John's-wort, hath spreading roots, sending up numerous slender square stalks, a foot long; oval, spear-shaped, close-fitting, smooth leaves by pairs opposite; and, at the end of the stalks, large yellow flowers. 4. The *androscæmum*, commonly called *tut-tan*, or *park-leaves*, hath an upright under-shrubby stalk, two feet high, branching by pairs opposite; and at the ends of the stalks, clusters of small yellow flowers appearing in July and August, and succeeded by roundish berry-like black capsules. This grows naturally in many parts of Britain. 5. The *halevaricum*, or water-leaved St. John's wort, is a native of Majorca; and hath a shrubby stalk, branching two feet high, with reddish scarified branches, small oval leaves warted underneath, and large yellow flowers appearing great part of the year. 6. The *monogynum*, or one-styled *China hypericum*, hath a shrubby purplish stalk, about two feet high; oblong, smooth, stiff, close-fitting leaves, of a shining green above, and white underneath; clusters of small yellow flowers, with coloured cups, and only one style, flowering the greatest part of the year.

The tut-tan long held a place in the medicinal catalogues; but its uses are very little thought of at present. The leaves given in substance are said to destroy worms. By distillation they yield an essential oil. The flowers tinge spirits and oils of a fine purple colour. Cows, goats and sheep eat the plant;

horses and swine refuse it. The dried plant boiled in water with alum dyes yarn of a yellow colour; and the Swedes give a fine purple tinge to their spirits with the flowers.

HYPERIDES, an orator of Greece, was the disciple of Plato and Isocrates, and governed the republic of Athens. He defended with great zeal and courage the liberties of Greece; but was put to death by Antipater's order, 322 B. C. He composed many orations, of which only one now remains. He was one of the ten celebrated Greek orators.

HYPERMNESTRA, in fabulous history, one of the 50 daughters of Danaus king of Argos. She alone refused to obey the cruel order Danaus had given to all his daughters, to murder their husbands the first night of their marriage; and therefore saved the life of Lynceus, after she had made him promise not to violate her virginity. Danaus, enraged at her disobedience, confined her closely in prison, whence Lynceus delivered her some time after.

HYPERSARCOSIS, in medicine and surgery, an excess of flesh, or rather a fleshy excrescence, such as those generally rising upon the lips of wounds, &c.

HYPHEN, an accent or character in grammar, implying that two words are to be joined, or connected into one compound word, and marked thus - ; as *pre-established, five-leaved, &c.* Hyphens also serve to connect the syllables of such words as are divided by the end of the line.

HYPNOTIC, in the materia medica, such medicines as any way produce sleep, whether called *narcotics, hypnotics, opiates, or soporifics.*

HYPNOTICUS SERPENS, the *Sleep-snake*, in zoology, the name of an East-Indian species of serpent, called by the Ceylonese *nint'polong*, a word importing the same sense. It is of a deep blackish brown, variegated with spots of white, and is a very fatal kind in its poison; its bite always bringing on a sleep which ends in death.

HYPNUM, **FEATHER-MOSS**, in botany; a genus of the natural order of musci, belonging to the cryptogamia class of plants. The anthera is operculated, or covered with a lid; the calyptra smooth; the filament lateral, and rising out of a perichætium, or tuft of leaflets different from the other leaves of the plant. There are 46 species, all of them natives of Great Britain; none of them, however, have any remarkable property, except the proliferum and parietinum. The first is of a very singular structure, one shoot growing out from the centre of another; the veil is yellow and shining; the lid with a kind of long bill; the leaves not shining; sometimes of a yellowish, and sometimes of a deep green. This moss covers the surface of the earth in the thickest shades, through which the sun never shines, and where no other plant can grow. The second hath shoots nearly flat and winged, undivided for a considerable length, and the leaves shining; but the old shoots do not branch into new ones as in the preceding species. It grows in woods and shady places; and, as well as the former, is used for filling up the chinks in wooden houses.

HYPO, a Greek particle, retained in the composition of divers words borrowed from that language: literally denoting *under, beneath*. In this sense it stands opposed to *ὑπερ supra*, "above."

HYPOBOLE, or **SUBJECTION**, from *ὑπο*, and *βαλλω I cast*, in rhetoric, a figure; so called, when several things are mentioned, that seem to make for the contrary side, and each of them refuted in order. This figure, when complete, consists of three parts; a proposition, an enumeration of particulars with their answer, and a conclusion. Thus Cicero, upon his return from banishment, vindicates his conduct in withdrawing so quietly, and not opposing the faction that ejected him. See **ORATORY**.

HYPOCATHARSIS, compounded of *ὑπο under*, and

καθαρσιν I purge, in medicine, a too faint or feeble purgation.

HYPOCAUSTUM, among the Greeks and Romans, a subterraneous place, where was a furnace to heat the baths. The word is Greek, formed of the preposition *ὑπο under*, and the verb *καίω to burn*. Another sort of hypocaustum was a kind of kiln to heat their winter parlours. The remains of a Roman hypocaustum, or sweating-room, were discovered under ground at Lincoln in 1739. We have an account of these remains in the Philosophical Transactions, No. 461, § 29. Among the moderns, the hypocaustum is that place where the fire is kept which warms a stove or hot-house.

HYPOCHÆRIS, **HAWK'S-EYE**, in botany; a genus of the polygamia æqualis order, belonging to the lyngenchæta class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is paleaceous; the calyx a little imbricated; the pappus glumy. There are four species; none of which have any remarkable property, except the maculata, or spotted hawk's-eye. It is a native of Britain, and grows on high grounds. The leaves are oblong, egg-shaped, and toothed; the stem almost naked, generally with a single branch; the blossoms yellow, opening at six in the morning, and closing at four in the afternoon. The leaves are boiled and eaten like cabbage. Horses are fond of this plant when green, but not when dry. Cows, goats, and swine eat it; sheep are not fond of it.

HYPOCHONDRIA, in anatomy, a space on each side the epigastric region, or upper part of the abdomen. See **ANATOMY**, page 185.

HYPOCHONDRIAC PASSION, a disease in men, similar to the hysteric affection in women. See **MEDICINE**.

HYPOCISTIS, in the materia medica, an inspissated juice obtained from the sessile asarum, much resembling the true Egyptian acacia. They gather the fruit while unripe, and express the juice, which they evaporate over a very gentle fire, to the consistence of an extract, and then form into cakes, and expose them to the sun to dry. It is an astringent of considerable power; is good against diarrhoeas and hæmorrhages of all kinds; and may be used in repellent gargarisms in the manner of the true acacia; but it is very rarely met with genuine in our shops, the German acacia being usually sold under its name.

HYPOCRISY, *ὑποκρισις*, in ethics, denotes dissimulation with regard to the moral or religious character. In other words, it signifies one who feigns to be what he is not; and is generally applied to those who assume the appearances of virtue or religion, without having any thing in reality of either.

HYPOGÆUM, *ὑπογαιον*, formed of *ὑπο under*, and *γαια earth*, in the ancient architecture, is a name common to all the parts of a building that are under ground; as the cellar, butteries, and the like places. The term *hypogæum* was used by the Greeks and Romans for subterraneous tombs in which they buried their dead.

HYPOGÆUM, *ὑποσάγιον*, in astrology, is a name given to the celestial houses which are below the horizon; and especially the *imium cæli*, or bottom of heaven.

HYPOGASTRIC, an appellation given to the internal branch of the iliac artery.

HYPOGASTRIUM, in anatomy, the middle part of the lower region of the belly.

HYPOGLOSSI, **EXTERNI**, or **MAJORES**, in anatomy, the ninth pair of nerves, called also *linguales* & *gustatorii*.

HYPOGLOTTIS, or **HYPOGLOSSIS**, compounded of *ὑπο under*, and *γλωττα tongue*, in anatomy, is a name given to two glands of the tongue. There are four large glands of the tongue; two of them called *hypoglottides*, situated under it, near the *venæ ranulares*; one on each side of the tongue. They serve to filtrate

a kind of ferous matter of the nature of saliva, which they discharge into the mouth by little ducts near the gums.

HYPOGLORTIS, or *Hypoglossis*, in medicine, denotes an inflammation or ulceration under the tongue; called also *ranula*.

St. HYPOLITE, a small town of France, in the department of Gard and late province of Languedoc. A canal crosses the town, which turns several mills, and supplies many fountains with water. An insult offered by the inhabitants to a priest, who was carrying the viaticum, occasioned the revocation of the edict of Nantes. This town has a good fort, and is situated on the Vidourle, near its source, 12 miles S. W. of Alais. E. lon. o. 4. N. lat. 43. 55.

HYPOPYON, in surgery, a collection of purulent matter under the corner of the eye.

HYPOSCENIUM, in antiquity, a partition under the pulpit or logeum of the Greek theatre, appointed for the music.

HYPOSTASIS, a Greek term, literally signifying *substance*, or *subsistence*; used in theology for *person*. The word is Greek, *ὑπόστασις*; compounded of *ὑπο* *sub*, "under," and *ἵστημι* *sto*, *existo*, "I stand, I exist;" q. d. *sub sistentia*. Thus we hold, that there is but one nature or essence in God, but three *hypostases* or persons. The term *hypostasis* is of a very ancient standing in the church. St. Cyril repeats it several times, as also the phrase *union according to hypostasis*. The first time it occurs is in a letter from that father to Nestorius, where he uses it instead of *πρὸς ὁμοῦ*, the word we commonly render *person*, which did not seem expressive enough. "The philosophers (says St. Cyril) have allowed three *hypostases*: they have extended the Divinity to three *hypostases*: they have even sometimes used the word *trinity*: and nothing was wanting but to have admitted the consubstantiality of the three *hypostases*, to show the unity of the divine nature, exclusive of all triplicity in respect of distinction of nature, and not to hold it necessary to conceive any respective inferiority of *hypostases*."

This term occasioned great dissensions in the ancient church; first among the Greeks, and afterwards also among the Latins. In the council of Nice, *hypostasis* was defined to denote the same with *essence* or *substance*; so that it was heresy to say that Jesus Christ was of a different *hypostasis* from the Father; but custom altered its meaning. In the necessity they were under of expressing themselves strongly against the Sabellians, the Greeks made choice of the word *hypostasis*, and the Latins of *persona*; which change proved the occasion of endless disagreement. The phrase *τρεῖς ὑποστάσεις*, used by the Greeks, scandalized the Latins, whose usual way of rendering *ὑποστάσις* in their language was by *substantia*. The barrenness of the Latin tongue in theological phrases allowed them but one word for the two Greek ones, *essentia* and *ὑποστάσις*; and thus disabled them from distinguishing *essence* from *hypostasis*. For which reason they chose rather to use the term *tres personæ*, and *tres hypostases*.—An end was put to logomachias, in a synod held at Alexandria about the year 362, at which St. Athanasius assisted; from which time the Latins made no great scruple of saying *tres hypostases*, nor the Greeks of *three persons*.

HYPOTHECA, in the civil law, an obligation, whereby the effects of a debtor are made over to his creditor, to secure his debt. The word comes from the Greek *ὑποθήκη*, a thing subjected to some obligation; of the verb *ὑποτίθεμαι*, *supponor*, "I am subjected;" of *ὑπο* *under*, and *τίθημι* *pono*, "I put."

As the hypotheca is an engagement procured on purpose for the security of the creditor, various means have been made use of to secure to him the benefit of the convention. The use of the pawn or pledge is the most ancient, which is almost the same thing with the hypotheca; all the difference consisting in this, that the pledge is put into the creditor's hands; whereas, in a simple hypotheca, the thing remained in the possession of the debtor. It was found more easy and commodious to engage an

estate by a civil covenant than by an actual delivery: accordingly the expedient was first practised among the Greeks; and from them the Romans borrowed both the name and the thing: only the Greeks, the better to prevent frauds, used to fix some visible mark on the thing, that the public might know it was hypothecate or mortgaged by the proprietor; but the Romans, looking on such advertisements as injurious to the debtor, forbade the use of them.

The Roman lawyers distinguished four kinds of hypothecas: the conventional, which was with the will and consent of both parties; the legal, which was appointed by law, and for that reason called *tacit*; the prætor's pledge, when by the flight or non-appearing of the debtor the creditor was put in possession of his effects; and the judiciary, when the creditor was put in possession by virtue of a sentence of the court. The *conventional* hypotheca is subdivided into general and special. The hypotheca is general, when all the debtor's effects, both present and future, are engaged to the creditor. It is special, when limited to one or more particular things. For the *tacit* hypotheca, the civilians reckon no less than twenty-six different species thereof.

HYPOTHENUSE, in geometry, the longest side of a right-angled triangle, or that which subtends the right angle.

HYPOTHESIS (formed of *ὑπο* "under," and *θεσις* *positio*, of *τίθημι* *pono*, "I put"), is a proposition or principle which we suppose, or take for granted, in order to draw conclusions for the proof of a point in question. In disputation, they frequently make false hypotheses, in order to draw their antagonists into absurdities; and even in geometry truths are often deducible from such false hypotheses. Every conditional or hypothetical proposition may be distinguished into hypothesis and thesis: the first rehearses the conditions under which any thing is affirmed or denied; and the latter is the thing itself affirmed or denied. Thus, in the proposition, A triangle is half of a parallelogram, if the bases and altitudes of the two be equal; the latter part is the hypothesis, "if the bases," &c. and the former the thesis, "a triangle is half a parallelogram." In strict logic, we are never to pass from the hypothesis to the thesis; that is, the principle supposed must be proved to be true, before we require the consequence to be allowed.

HYPOTHESIS, in physics, &c. denotes a kind of system laid down from our own imagination, whereby to account for some phenomenon or appearance of nature. Thus, we have hypotheses to account for the tides, for gravity, for magnetism, for the deluge, &c. The real and scientific causes of natural things generally lie very deep: observation and experiment, the proper means of arriving at them, are in most cases extremely slow; and the human mind is very impatient: hence we are frequently driven to feign or invent something that may seem like the cause, and which is calculated to answer the several phenomena, so that it may possibly be the true cause.

Philosophers are divided as to the use of such fictions or hypotheses, which are much less current now than they were formerly. The latest and best writers are for excluding hypotheses, and standing wholly on observation and experiment. Whatever is not deduced from phenomena, says Sir Isaac Newton, is an hypothesis; and hypotheses, whether metaphysical, or physical, or mechanical, or of occult qualities, have no place in experimental philosophy.

The Cartesians take upon them to suppose what affections in the primary particles of matter they please; just what figures, what magnitudes, what motions, and what situations, they find for their purpose. They also feign certain unseen, unknown fluids, and endue them with the most arbitrary properties; give them a subtilty which enables them to pervade the pores of all bodies, and make them agitated with the most unaccountable motions. But is not this to set aside the real constitution of

things, and to substitute dreams in their place? Truth is scarce attainable even by the surest observations; and will fanciful conjectures ever come at it? They who found their speculations on hypotheses, even though they argue from them regularly, according to the strictest laws of mechanics, may be said to compose an elegant and artful fable; but it is still only a fable.

HYPOTHESIS is more particularly applied in astronomy to the several systems of the heavens; or the different ways in which different astronomers have supposed the heavenly bodies to be ranged, moved, &c.

The principal hypotheses are the Ptolemaic, Copernican, and Tychonic. The Copernican is now become so current, and is so well warranted by observation, that the retainers thereto hold it injurious to call it an *hypothesis*. See ASTRONOMY.

HYPOTYPOSIS, or Imagery, ὑποτύποισις, formed of the verb ὑποτίπω *per figuram demonstro, I show, represent, or make any thing be seen*; of ὑπό *under*, and τύπος *type, image, resemblance*, in Rhetoric, a figure whereby a thing is described or painted in such strong and bright colours, that it does not seem to be read, or heard, but actually seen, or presented before the eyes. Such is that elegant one of Cicero, wherein he paints the barbarity of Verres: *Ipse inflammatus scelere & furore in forum venit. Ardabant oculi; toto ex ore crudelitas emanabat. Expectabant omnes quo tandem progressurus, aut quidnam acturus esset; cum repente hominem corripit, atque in foro medio nudari ac deligari, & virgas expedire jubet. Clamabat ille miser se civem esse Romanum, &c.* Such is also the picture which he has drawn of Catiline, consisting of an unaccountable mixture of contrary qualities. Pro Cæl. c. 5. The *hypotyposis* is frequently used by the poets, and particularly Virgil, who abounds in paintings. This figure is peculiarly suited for drawing characters, and often affords the finest ornaments in poetry and history, as well as oratory. It is also adapted to move and interest different passions, according to the nature of the subject, and the artful management of the speaker.

HYPOXIS, in botany; a genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 10th order, *Coronariæ*. The corolla is divided into six parts, and persilting, superior; the capsule narrowing at the base; the calyx a bivalved glume.

HYPHISTARII, formed from ὑψιστος "*highest*," a sect of heretics in the fourth century; thus called from the profession they made of worshipping the most high God. The doctrine of the Hyphistarians was an assemblage of Paganism, Judaism, and Christianity. They adored the most high God with the Christians: but they also revered fire and lamps with the Heathens; and observed the sabbath, and the distinction of clean and unclean things, with the Jews. The Hyphistarii bore a near resemblance to the Euchites, or Massalians.

HYRCANIA, in ancient geography, a country of the farther Asia, lying to the south-east of the *Mare Hyrcanum* or *Caspium*; with Media on the west, Parthia on the south, and Margiana on the west. Famous for its tigers (Virgil); for its vines, figs, and olives (Strabo).

HYRCANIA, in ancient geography, a town of Lydia, in the *campus Hyrcanus*, near Thyatira; so called from colonists brought from Hyrcania, a country lying to the south of the Caspian sea. The people called *Hyrcani Macedones*, because a mixed people (Pliny).—Another Hyrcania, the metropolis of the country called *Hyrcania*. Thought to be the Tape of Strabo, the Syrius of Polybius, the Zeudracarta of Arrian, and the Asaia of Isidorus Characenus. A third, a strong place of Judea, built by Hyrcanus.

HYSSOP. See HYSSOPUS.

Hedge HYSSOP. See GRATIOLA.

HYSSOPJS, HYSSOP; a genus of the gymnospermia order, belonging to the didynamia class of plants. There are three spe-

cies; but only one of them, viz. the *officinalis*, or common hyssop, is cultivated for use. This hath under-shrubby, low, bushy stalks, growing a foot and an half high; small, spear-shaped, close-fitting, opposite leaves, with several smaller ones rising from the same joint; and all the stalks and branches terminated by erect whorled spikes of flowers, of different colours in the varieties. They are very hardy plants; and may be propagated either by slips or cuttings, or by seeds. The leaves have an aromatic smell, and a warm pungent taste. Besides possessing the general virtues of aromatics, they have been supposed useful in humoral asthmas, coughs, and other disorders of the lungs; and are said to promote expectoration.

Hyssop was generally made use of in purifications amongst the Jews by way of a sprinkler. Sometimes they added a little wool to it of a scarlet colour; for example, they dipped a bunch of hyssop, some branches of cedar, and red wool, in water mingled with the blood of a bird, in the purification of lepers. Hyssop, it is probable, grew to a considerable height in Judæa, since the Gospel informs us that the soldiers filled a sponge with vinegar, put it upon a reed (or long stem) of hyssop, and presented it to our Saviour upon the cross.

HYSTERIC AFFECTION, or *Passion*, formed of ὑστέρα "*womb*;" a disease in women, called also vulgarly *fits of the mother*. It is a spasmodic affection of the nervous system, proceeding often from uterine affections, but chiefly from mental causes. See MEDICINE.

HYSTERON PROTERON, in grammar and rhetoric, a species of the hyperbaton, wherein the proper order of construction is so inverted, that the part of any sentence which should naturally come first is placed last: as in this of Terence, *Valet et vivit*, for *vivit et valet*; and in the following of Virgil, *Moriamur, & in media arma ruamus*, for *In media arma ruamus, & moriamur*.

HYSTRIX, in zoology, a genus of quadrupeds belonging to the order of glires, the characters of which are these: They have two fore teeth, obliquely divided both in the upper and under jaw, besides eight grinders; and the body is covered with quills or prickles. See pl. 12. There are four species, viz.

1. The *crislata*, or crested porcupine, has four toes on the fore-feet, five toes on the hind-feet, a crested head, a short tail, and the upper lip is divided like that of a hare. The length of the body is about two feet, and the height about two feet and an half. The porcupine is covered with prickles, some of them nine or ten inches long, and about $\frac{1}{4}$ th of an inch thick. Like the hedge-hog, he rolls himself up in a globular form, in which position he is proof against the attacks of the most rapacious animals. The prickles are exceedingly sharp, and each of them has five large black and as many white rings, which succeed one another alternately from the root to the point. These quills the animal can erect or let down at pleasure; when irritated, he beats the ground with his hind-feet, erects his quills, shakes his tail, and makes a considerable rattling noise with his quills.—Most authors have asserted that the porcupine, when irritated, darts his quills to a considerable distance against the enemy, and that he will kill very large animals by this means. But M. Buffon and some other late naturalists assure us, that the animal possesses no such power. M. Buffon frequently irritated the porcupine, but never saw any thing like this darting of his quills. He says indeed, that when the creature was much agitated with passion, some of the quills which adhered but slightly to the skin would fall off, particularly from the tail; and this circumstance, he imagines, has given rise to the mistake. The porcupine, though originally a native of Africa and the Indies, can live and multiply in the more temperate climates of Spain and Italy. Pliny, and every other natural historian since the days of Aristotle, tells us, that the porcupine, like the bear, conceals itself during the winter, and that it brings forth its young in 80 days.

But these circumstances remain to this day uncertain. It is remarkable, that although this animal be very common in Italy, no person has ever given us a tolerable history of it. We only know in general, that the porcupine, in a domestic state, is not a fierce or ill-natured animal; that with his fore-teeth, which are strong and sharp, he can cut through a strong board; that he eats bread, fruits, roots, &c.; that he does considerable damage when he gets into a garden; that he grows fat, like most animals, about the end of summer; and that his flesh is not bad food.

2. The *prehensilis*, or *Brazilian porcupine*, has four toes on the fore-feet, five on the hind-feet, and a long tail. It is considerably less than the former species; being only 17 inches long from the point of the muzzle to the origin of the tail, which is nine inches long; the legs and feet are covered with long brownish hair; the rest of the body is covered with quills interspersed with long hairs: the quills are about five inches long, and about $\frac{1}{4}$ th of an inch in diameter. He feeds upon birds and small animals. He sleeps in the day like the hedge-hog, and searches for his food in the night. He climbs trees, and supports himself by twirling his tail round the branches. He is generally found in the high grounds of America from Brasil to Louisiana, and the southern parts of Canada. His flesh is esteemed very good eating.

A variety of this species is the *Hoitzlacuatzin*, or Mexican porcupine (*Le Coendou* de Buffon). It is of a dusky colour, with very long bristles intermixed with the down: the spines three inches long, slender, and varied with white and yellow; scarcely apparent except on the tail, which is, according to Hernandez, thicker and shorter than that of the preceding species. He adds, that the tail from the middle to the end is free from spines; and that it grows to the bulk of a middle-sized dog.

M. de Buffon says, its length is 16 or 17 inches from the nose to the tail; the tail 9 French measure, but taken from a mutilated skin. It inhabits the mountains of Mexico, where it lives on the summer fruits, and may be easily made tame. The Indians pulverise the quills, and say they are very efficacious in gravelly cases; and applied whole to the forehead, will relieve the most violent headach. They adhere till filled with blood, and then drop off.

3. The *dorsata*, or Canada porcupine (*Purson* de Buffon), has four toes on the fore-feet, five on the hind-feet; and has quills only on the back, which are short, and almost hid among the long hair. He is about two feet long. This species inhabits North America as high as Hudson's Bay, and makes its nest under the roots of great trees. It will also climb among the boughs, which the Indians cut down when one is in them, and kill the animal by striking it over the nose. They are very plentiful near Hudson's Bay; and many of the trading Indians depend on them for food, esteeming them both wholesome and pleasant. These animals feed on wild fruits and bark of trees, especially juniper; eat snow in winter, and drink water in summer; but avoid going into it. When they cannot avoid their pursuer, they will sidle towards him, in order to touch him with their quills, which seem but weak weapons of offence; for, on stroking the hair, they will come out of the skin, sticking to the hand. The Indians stick them in their noses and ears, to make holes for the placing their ear-rings and other finery: they also trim the edges of their deer-skin habits with fringes made of the quills, or cover with them their bark-boxes.

4. The *macroura*, has five toes both on the hind and fore-feet; his tail is very long, and the prickles are elevated. He inhabits the isles of the Indian Archipelago, and lives in the forests.

HYTHE. See HITHE.

I.

I

J A B

I, or *i*, the ninth letter and third vowel of the alphabet, is pronounced by throwing the breath suddenly against the palate, as it comes out of the larynx, with a small hollowing of the tongue, and nearly the same opening of the lips in talk as in pronouncing *a* or *e*. Its sound varies: in some words it is long, as *bigb*, *mind*, &c.; in others short, as *bid*, *hid*, *fin*, &c.; in others, again, it is pronounced like *y*, in *collier*, *onion*, &c.; and in a few, it sounds like *ee*, as in *machine*, *magazine*, &c. No English word ends in *i*, *e* being either added to it, or else the *i* turned into *y*.

But besides the vowel, there is the *jod* consonant; which, because of its different pronunciation, has likewise a different form, thus *J, j*. In English, it has the soft sound of *g*; nor is used but when *g* soft is required before vowels where *g* is usually hard: thus we say, *jack*, *jet*, *join*, &c. instead of *gack*, *get*, *goin*, &c. which would be contrary to the genius of the English language.

I, used as a numeral, signifies *one*, and stands for so many units as it is repeated times: thus **I**, one; **II**, two; **III**, three, &c.; and when put before a higher numeral, it subtracts itself, as **IV**, four; **IX**, nine, &c. But when set after it, so many are added to the higher numeral as there are *I*'s added: thus **VI** is 5 + 1, or six; **VII**, 5 + 2, or seven; **VIII**, 5 + 3, or eight. The ancient Romans likewise used **IO** for 500, **CIO** for 1000, **IOO** for 5000, **CCIOO** for 10,000, **IOOO** for 50,000, and **CCCIOOO** for 100,000. Farther than this, as Pliny observes, they did not go in their notation; but, when necessary, repeat-

ed the last number, as **CCCIIOOO**, **CCCIIOOO**, for 200,000; **CCCIIOOO**, **CCCIIOOO**, **CCCIIOOO**, for 300,000; and so on.

The ancients sometimes changed *i* into *u*; as *decumus* for *decimus*; *maxumus* for *maximus*, &c.

According to Plato, the vowel *i* is proper to express delicate, but humble things, as in this verse in Virgil which abounds in *i*'s, and is generally admired: *Accipiunt inimicum imbrem, rimisque fatiscunt*.

I, used as an abbreviature, is often substituted for the whole word *JESUS*, of which it is the first letter.

JABOK, a brook on the other side of the Jordan, the spring whereof is in the mountains of Gilead. It falls into Jordan pretty near the sea of Tiberias, to the south of this sea. Near this brook the patriarch Jacob wrestled with the angel (Gen. xxxii. 22). The Jabbok separated the land of the Ammonites from the Gaulonites, and the territories of Og king of Bashan.

JABESH, or **JABESH-GILEAD**, was the name of a city, in the half tribe of Manassah, beyond Jordan. The scripture calls it generally *Jabesh Gilead*, because it lay in Gilead, at the foot of the mountains which go by this name. Eusebius places it six miles from Pella, towards Gerasa; and consequently it must be eastward of the sea of Tiberias.

JABIRU. See MYCTERIA.

JABLONSKI (**DANIEL ERNEST**), a learned Polish Protestant divine, born at Dantzick in 1660. He became successively minister of Magdeburg, Lissa, Königsberg, and Berlin; and was at length ecclesiastical counsellor, and president of the academy

of sciences at the latter. He took great pains to effect an union between the Lutherans and Calvinists; and wrote some works which are esteemed, particularly *Meditations on the Origin of the Scriptures*, &c. He died in 1741.

JABLONSKI (Theodore), counsellor of the court of Prussia, and secretary of the royal academy of sciences at Berlin, was also a man of distinguished merit. He loved the sciences, and did them honour, without that ambition which is generally seen in men of learning: it was owing to this modesty that the greatest part of his works were published without his name. He published, in 1711, a French and German Dictionary; a Course of Morality, in 1713; a Dictionary of Arts and Sciences, in 1721; and translated *Tacitus de Moribus Germanorum* into High Dutch, in 1724.

JABLUNKA, a town of Silesia, in the territory of Teschen, 30 miles S. E. of Troppaw. E. lon. 18. 10. N. lat. 49. 41.

JABNE, in ancient geography, a town of Palestine, near Joppa; called *Jannia* or *Jammial*, by the Greeks and Romans. In Joshua xv. it seems to be called *Jabneel*; but in 2 Chron. xxvi. *Jibne*. It was taken from the Philistines by Uzziah, who demolished its fortifications. Its port, called *Jamniturum portus*, lay between Joppa and Azotus.

JACAMAR, in ornithology. See **ALCEDO**.

JACCA, an ancient town of Spain, in Arragon, with a bishop's see, and a fort, seated on a river of the same name, among the mountains of Jacca, which are a part of the Pyrenees, 22 miles N. of Huesca, and 50 N. by E. of Saragossa. W. lon. 0. 9. N. lat. 42. 36.

JACI-DE-AGUILA, a sea-port of Sicily, on the eastern coast, between Catania and Tavormina. E. lon. 15. 26. N. lat. 37. 27.

JACK, in mechanics, an instrument in common use for raising heavy timber, or very great weights of any kind. See pl. 22. fig. 1. But as the wheel-work of this engine is enclosed in the strong piece of timber C B, the inside of it is represented in fig. 2, where the rack A B must be supposed at least four times as long in proportion to the wheel Q, as the figure represents it; and the teeth, which will be then four times more in number, to be contained about three in an inch. Then if the handle H P be seven inches long, five turns of it, i. e. 5 times 22 inches, or 110 inches, will be the velocity of the power, whilst the weight raised by the claw A, or depressed by the claw B, moves one inch: for, as the pinion of the handle has but four leaves, and the wheel Q twenty teeth, there must be five revolutions of the handle to turn the wheel once round, whose three-leaved pinion R will, in that revolution, just move the rack three teeth, or one inch. This might have been also known without seeing, or even knowing the number of the teeth of the wheel and pinions, by measuring a revolution of the handle in fig. 1, and comparing the space gone through by it with the space gone through by the end A or B. This machine is sometimes open behind from the bottom almost up to the wheel Q, to let the lower claw, which in that case is turned up as at B, draw up any weight. When the weight is drawn or pushed sufficiently high, it is kept from going back by hanging the end of the hook S, fixed to a staple, over the curved part of the handle at b.

JACK, a well-known engine used for turning a spit: the weight is the power applied; the friction of the parts, and the weight with which the spit is charged, are the force to be overcome; and a steady uniform motion is maintained by means of the FLY.

Smoke-JACK, an engine used for the same purpose with the common jack, and so called from its being moved by means of the smoke or rarefied air, ascending the chimney, and striking against the tail of the horizontal wheel A B, pl. 22, which, being inclined to the horizon, is moved about the axis of the wheel,

together with the pinion C, which carries the wheels D and E; and E carries the chain F, which turns the spit. The wheel A B should be placed in the narrow part of the chimney, where the motion of the smoke is swiftest, and then the greatest part of it must strike upon the sails. The force of this machine depends on the draught of the chimney, and the vehemence of the fire.

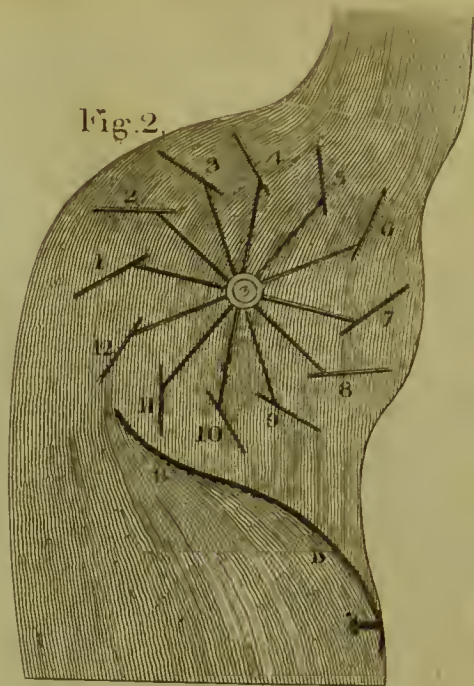
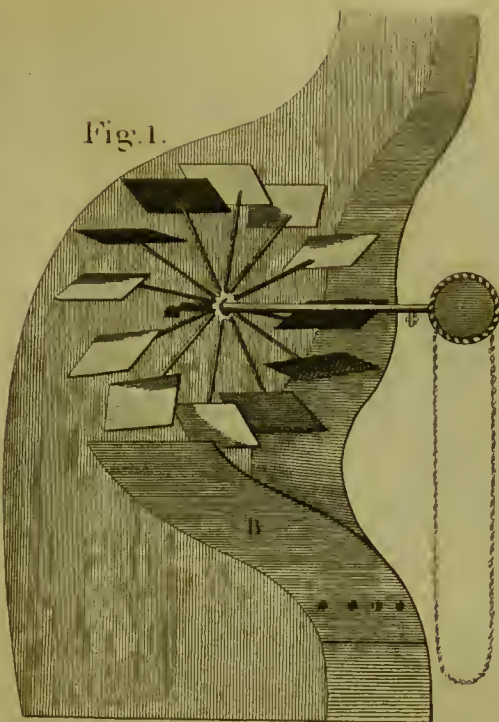
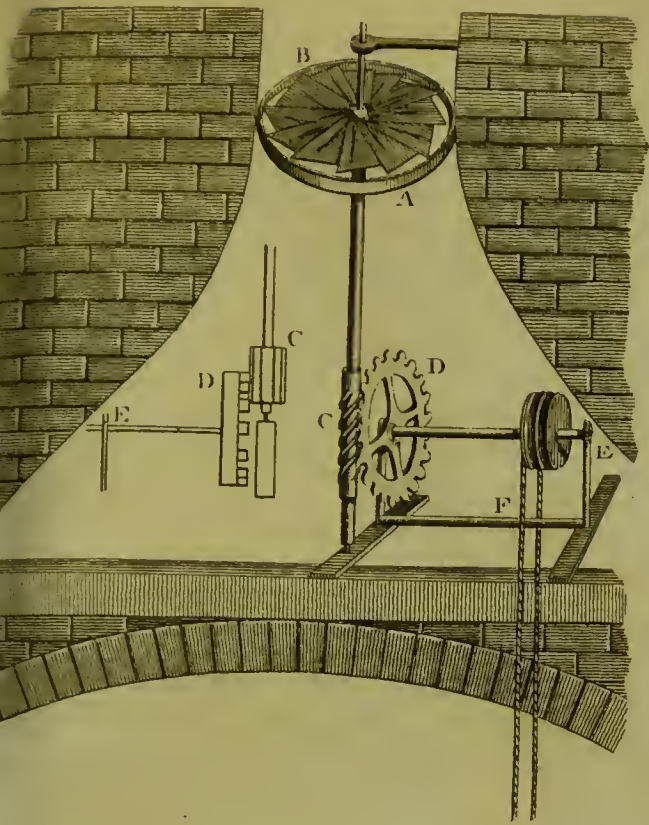
In the Repertory of Arts, vol. vi. we find the following specification of Mr. Braithwaite's patent for certain improvements in the construction of smoke-jacks.

Fig. 1. pl. 22. represents a perspective view of a vertical flyer of a smoke or air jack, supposed to be fixed in a chimney, the axis of which should be placed parallel to the horizon; and although it will do if the axis is not exactly parallel with the horizon, yet the nearer it is horizontal the better. The axis of the flyer may pass through the breast of the chimney, on the extremity of which (being left square) a chain suspended will turn a spit, with sufficient power to roast a moderate-sized joint of meat; but, as greater force will sometimes be required, it will be expedient to fix on the axis a pinion or worm, to which may be applied a cog or tooth wheel, of any convenient size, which will be turned by the pinion or worm, when the flyer is put into motion by the pressure of the air or smoke on the fans or floats, arising from the draught occasioned by the fire. On the cog or tooth wheel, or a metal or wooden wheel on the same axis, a chain or chains suspended will turn a spit or spits for roasting. If the chain be suspended from the axis of the flyer, two collars ought to be fixed upon the axis, to confine the chain to its proper place.

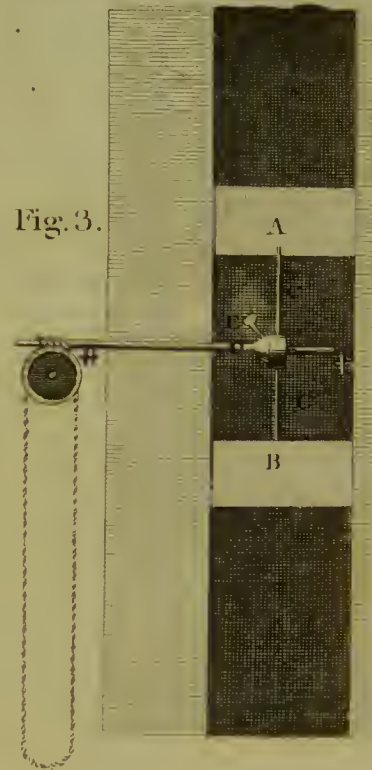
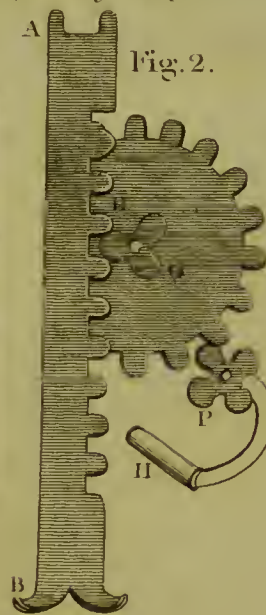
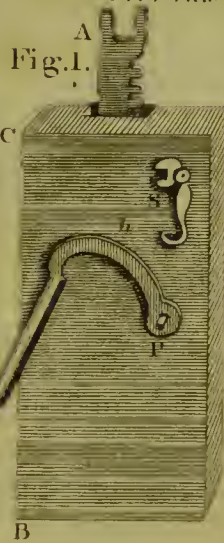
B represents a plate of iron, or other metal, which should be fixed to one side of the chimney, either above or below the flyer or wheel, but it will have the greater effect when fixed below: its use is as a conductor of the air or smoke to the fans or floats of the flyer in a particular direction, as may be seen in the drawing; and it should be so placed as to guard and cover about three fifths of the flyer, so as to conduct the air or smoke beyond the centre of the flyer or wheel, that it may act with all its force on the fans or floats of the flyer not guarded by the plate B. Without this plate, the air or smoke would act on both sides of the flyer with nearly an equal power, and consequently would prevent the flyer from moving at all. The effect of the plate may be produced by erecting an abutment of brick, stone, or other materials; in which case, however, a cavity ought to be made in the breast of the chimney, covered by a movable plate, sufficiently large to admit the flyer, which will require to be taken down when the chimney is swept. The size of the flyer or wheel must be increased or diminished, according to the size of the chimney it is to be fixed in; and the number of fans or floats must be more or less, according as the diameter is increased or diminished.

Fig. 2. is a sectional view of one side of a flyer, drawn to a scale supposed to be two feet six inches in diameter, which will be found large enough for common use; it has twelve floats or fans, marked from No. 1 to 12, but the number may be more or less, as shall be found most convenient. They may be supported from the centre by twelve arms, or by an arm at each end of the flyers, or by rings, or in a water-wheel, or by any other mode which the maker may prefer. The angle which the fans or floats are set to, from a straight line drawn through the axis of the flyer, in this drawing, (namely, about fifty degrees,) is probably the best; though they might be fixed in a right line from the centre, and the flyer or wheel move, but not with so much power as when set in the manner of the drawing. B B represents the conducting-plate, which should be fixed to one side of the chimney, and closed to the back and breast, so as to prevent the air from passing through any other channel except over the end of the plate.

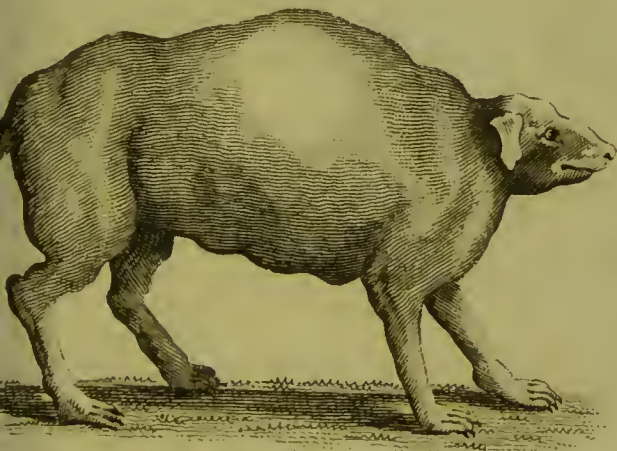
Fig. 3. represents the section of the flyer or wheel, shewing



Jack for raising heavy Weights.



Itzecuintepotzotli.



Jatropha Elastica.



Jatropha Manihot.



two fans or floats. A and B are plates of iron, copper, or other proper materials; the length of the fans or floats here represented is fourteen inches, and the breadth about six inches; the extreme diameter of the fans or floats, from out to out, two feet six inches. CC are arms which the fans or floats are made fast to, which may be fixed in a collar of iron, or other metal, turned with a hole for the axis D; which axis is also turned to fit the hole; and, when the flyer is put in its proper place in the chimney, the screw E, being turned, fastens the flyer or wheel on the axis; and, by loosening the screw, and removing the axis, the flyer may be taken down when the chimney requires sweeping. Or the arms may be fixed into the axis; and also the axis may be supported in many other ways, according to the direction of the workman; particularly by fixing the arms at the extremity of the axis, and supporting the axis within the breast of the chimney, so as to obviate the necessity of carrying it to the back of the chimney. No oil in this case will be requisite within the chimney, which has hitherto been found an inconvenience attending the common smoke jack.

JACK, in the sea language, a sort of flag or colours, displayed from a mast erected on the outer end of a ship's bowsprit. In the British navy the jack is nothing more than a small union flag, composed of the intersection of the red and white crosses; but in merchant ships this union is bordered with a red field.

JACK is used also for a horse or wooden frame to saw timber upon; for an implement to pull off a pair of boots; for a great leathern pitcher to carry drink in; for a small bowl that serves as a mark at the exercise of bowling; and for a young pike.

JACK-Flag, in a ship, that hoisted up at the spritsail top-mast head.

JACK Daw, the English name of a species of corvus. See **CORVUS**. This bird is very mischievous to the farmer and gardener; and is of such a thievish disposition, that he will carry away much more than he can make use of. There is a method of destroying them by a kind of springe much used in England; and is so proper, that it ought to be made universal.—A stake of about five feet long is to be driven firmly into the ground, and made so fast that it cannot move, and so sharp in the point that the bird cannot settle upon it. Within a foot of the top there must be a hole bored through it, of three quarters of an inch diameter; through this hole is to be put a stick of about eight inches long; then a horse-hair springe or noose is to be made fast to a thin hazel wand, and this brought up to the place where the short stick is placed, and carried with it through the hole, the remainder being left open under that stick. The other end of the hazel rod is to be put through a hole in the stake near the ground, and fastened there. The stake is to be planted among the jackdaw's food, and he will naturally be led to settle on it; but finding the point too sharp, he will descend to the little cross stick. This will sink with his weight, and the springe will receive his leg, and hold him fast.

JACKALL, in zoology. See **CANIS**.

JACKSON (THOMAS), an eminent English divine, was born at Witton in the bishopric of Durham in 1579, of a good family. He commenced doctor of divinity at Oxford in 1612; and at last was made chaplain in ordinary, prebendary of Winchester, and dean of Peterborough. He was a very great scholar, and died in 1640. His publication on the Creed is a learned and valuable piece; which, with his other works, was published in 1673.

JACOB, the son of Isaac and Rebekah, was born in the year of the world 2168; before Jesus Christ 1830. The history of this patriarch is given at large in the book of Genesis. He died in Egypt in the 147th year of his age. Joseph directed that the body should be embalmed, after the manner of the Egyptians; and there was a general mourning for him throughout Egypt for seventy days. After this, Joseph and his brethren, accompa-

nied with the principal men of Egypt, carried him, with the king of Egypt's permission, to the burying-place of his fathers near Hebron, where his wife Leah had been interred. When they were come into the land of Canaan, they mourned for him again for seven days; upon which occasion the place where they staid was called *Abelmisraim*, or the mourning of the Egyptians.

JACOB (Ben Hajim), a rabbi famous for the collection of the *Maforah* in 1525; together with the text of the Bible, the Chaldaic paraphrase, and Rabbinical commentaries.

JACOB (Ben Naphthali), a famous rabbi of the 5th century: he was one of the principal *massorets*, and bred at the school of Tiberias in Palestine with Ben-Asher, another principal *massoret*. The invention of points in Hebrew to serve for vowels, and of accents to facilitate the reading of that language, are ascribed to these two rabbis; and said to be done in an assembly of the Jews held at Tiberias, A. D. 476.

JACOB (Giles), an eminent law-writer, born at Romsey in the county of Southampton, in 1686. He was bred under a considerable attorney; and is principally known for his *Law Dictionary* in one vol. folio, which has been often printed; a new and improved edition having been given by counsellors Ruffhead and Morgan. Mr. Jacob also wrote two dramatic pieces; and a *Poetical Register*, containing the lives and characters of English dramatic poets. The time of his death is not known.

JACOBÆUS (OLIGER), a celebrated professor of physic and philosophy at Copenhagen, was born in 1651 at Arhusen in the peninsula of Jutland, where his father was bishop. Christian V. intrusted him with the management of his grand cabinet of curiosities; and Frederic IV. in 1698 made him counsellor of his court of justice. He wrote many medical works, and some excellent poems.

JACOBINE MONKS, the same with **DOMINICANS**.

JACOBINES, a term of reproach bestowed on the persons who, vindicating the doctrines of passive obedience and non-resistance with respect to the arbitrary proceedings of princes, disavowed the revolution in 1688, and asserted the supposed rights and adhered to the interests of the abdicated King James and his family.

JACOBITES, in church history, a sect of Christians in Syria and Mesopotamia; so called, either from Jacob a Syrian who lived in the reign of the emperor Mauritius, or from one Jacob a monk who flourished in the year 550. The Jacobites are of two sects, some following the rites of the Latin church, and others continuing separated from the church of Rome. There is also a division among the latter, who have two rival patriarchs. As to their belief, they hold but one nature in Jesus Christ; with respect to purgatory and prayers for the dead, they are of the same opinion with the Greeks and other eastern Christians: they consecrate unleavened bread at the eucharist, and are against confession, believing that it is not of divine institution.

JACOBUS, a gold coin, worth 25 shillings; so called from King James I. of England, in whose reign it was struck. We usually distinguish two kinds of *Jacobus*, the *old* and the *new*; the former valued at 25 shillings, weighing six pennyweights ten grains; the latter called also *Carolus*, valued at 23 shillings, in weight five pennyweights twenty grains.

JACQUINIA, in botany; a genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking with those of which the order is doubtful. The corolla is decemfid; the stamina inserted into the receptacle; the berry monospermous.

JACULATOR, or SHOOTING-FISH. See **CHÆTODON**.

JADDESSES is the name of an inferior order of priests in Ceylon, who have the care of the chapels appropriated to the genii, who form a third order of gods among these idolaters. These priests are applied to by the people in a time of disease or

calamity, who offer a cock on their behalf to appease the anger of the demons.

JADE-STONE, *LAPIS NEPHRITICUS*, or *Jaspachates*, a genus of siliceous earths. It gives fire with steel, and is semitransparent like flint. It does not harden in the fire, but melts in the focus of a burning glass into a transparent green glass with some bubbles. A kind brought from the river of the Amazons in America, and called *circumcision stone*, melts more easily in the focus into a brown opaque glass, far less hard than the stone itself. The jade-stone is unctuous to the touch; whence Mr. Kirwan seems to suspect, that it contains a portion of argillaceous earth, or rather magnesia. The specific gravity is from 2.970 to 3.389; the texture granular, with a greasy look, but exceedingly hard, being superior in this respect even to quartz itself. It is infusible in the fire, nor can it be dissolved in acids without a particular management; though M. Saussure seems to have extracted iron from it. Sometimes it is met with of a whitish milky colour from China; but mostly of a deep or pale green from America. The common lapis nephriticus is of a grey, yellowish, or olive colour. It has its name from a supposition of its being capable of giving ease in nephritic pains, by being applied externally to the loins. It may be distinguished from all other stones by its hardness, semipellucidity, and specific gravity.

JAEN, a handsome town of Spain, in Andalusia, with a bishop's see, and a strong castle. It is seated in a country producing excellent fruits, and very fine silk, at the foot of a mountain, 15 miles S. W. of Baeza, and 115 E. of Seville. W. lon. 3. 22. N. lat. 37. 38.

JAFFA, an ancient town of Asia, in Palestine, formerly called Joppa. It is entirely fallen from its ancient grandeur, and is 50 miles N. W. of Jerusalem. E. lon. 35. 0. N. lat. 32. 16.

JAFFATEEN ISLANDS, the name of four islands in the Red Sea, visited by Mr. Bruce in his late travels. They are joined together by shoals or sunk rocks; are crooked or bent like half a bow; and are dangerous for ships in the night-time, because there seems to be a passage between them, to which while the pilots are paying attention, they neglect two small sunk rocks which lie almost in the middle of the entrance in deep water.

JAFNAPATAN, a sea-port town, seated at the north-east end of the island of Ceylon in the East Indies. The Dutch took it from the Portuguese in 1658, and have continued in the possession of it since that time. They export from thence great quantities of tobacco, and some elephants, which are accounted the most docile of any in the world. E. lon. 80. 25. N. lat. 9. 30.

JAGARNAUT, a famous pagoda, in the peninsula of Hindoostan, and province of Orissa. It lies on the bay of Bengal, close to the shore, and a few miles to the E. of lake Chilka. It is a shapeless mass of building, and no otherwise remarkable than as one of the first objects of Hindoo veneration, and an excellent sea-mark. It has no claim to great antiquity. It is 311 miles S. W. of Calcutta. E. lon. 85. 40. N. lat. 19. 35.

JAGERNDORF, a town and castle of Silesia, capital of a province of the same name, seated on the river Oppa, 65 miles S. by E. of Breslaw. E. lon. 17. 24. N. lat. 50. 4.

JAGGERNAUT, a black pyramidal stone worshipped by the Gentoos, who pretend that it fell from heaven or was miraculously presented on the place where their temple stands. There are many other idols of this figure in India; which, however, are all but accounted copies from the Jaggernaut. According to the best information Mr. Grose could obtain, this stone is meant to represent the power presiding over universal generation, which they attribute to the general heat and influence of the sun acting in subordination to it. Domestic idols of the form of the Jaggernaut, and distinguished by the same name, are made by the Gentoos. These are niched up in a kind of triumphal car,

decorated with gilding and tinsel; which for some days they keep in the best apartment in their house. During this time their devotion consists in exhibiting the most obscene postures and acting all manner of lasciviousness, in sight as it were of the idol, and as the most acceptable mode of worship to that deity it represents; after which they carry it in its gilded car in procession to the Ganges, and throw in all together as an acknowledgment to that river of its congenial fertilization with that of the sun. Formerly this machine was decorated with jewels and other expensive ornaments; but the Indians are now become less extravagant, as they found that the Moors and Christians, watching the places where they threw in their idols, dived for them for the sake of the jewels with which they were adorned.

Our author conjectures, that this pyramidal form of the Gentoos idol was originally taken from that of flame, which always inclines to point upwards. From this Indian deity he supposes the shape of the Paphian Venus to have been derived, for which Tacitus could not account. This image had nothing of the human form in it, but rose orbicularly from a broad basis, and in the nature of a race goal tapering to a narrow convex a-top; which is exactly the figure of the idol in India, consecrated to such an office as that heathen deity was supposed to preside over, and to which, on the borders of the Ganges especially, the Gentoos virgins are brought to undergo a kind of superficial defloration before they are presented to their husbands.

JAGHIRE OF THE CARNATIC, a tract of land, in the peninsula of Hindoostan, subject to the English E. India Company. It extends along the bay of Bengal, from Madras to lake Pullicate on the N. to Alemparvé on the S. and to Conjeveram on the W. being 108 miles along the shore, and 47 inland in the widest part. The term Jaghire means, generally, a grant of land from a sovereign to a subject, revokable at pleasure, but generally a life-rent. But the Jaghire of the Carnatic, major Rennell thinks, is understood to be held in perpetuity. It contains 2440 square miles, and its revenue is about 150,000l. per annum.

JAGO (RICHARD), an ingenious poet, was vicar of Snitterfield in Warwickshire, and rector of Kimcote in Leicestershire. He was the intimate friend and correspondent of Mr. Shenstone, contemporary with him at Oxford, and, it is believed, his schoolfellow; was of University College; took the degree of M. A. July 9, 1739; was author of several poems in the 4th and 5th volumes of Dodsley's Poems; published a sermon, in 1755, on the Causes of Impenitence considered, preached May 4, 1755, at Harbury in Warwickshire, where he was vicar, on occasion of a conversation said to have passed between one of the inhabitants and an apparition in the church-yard there; wrote "Edge-hill," a poem, for which he obtained a large subscription in 1767; and was also author of "Labour and Genius," 1768, 4to; of "The Blackbirds," a beautiful elegy in the *Adventurer*; and of many other ingenious performances. He died May 28, 1781.

ST. JAGO, a large river of South America, which rises in the audience of Quito and Peru. It is navigable; and falls into the South Sea, after having watered a fertile country abounding in cotton-trees, and inhabited by wild Americans.

ST. JAGO, the largest, most populous and fertile of the Cape Verd islands, on the coast of Africa, and the residence of the Portuguese viceroy. It lies about 13 miles eastward from the island of Mayo, and abounds with high barren mountains; but the air, in the rainy season, is very unwholesome to strangers. Its produce is sugar, cotton, wine, and some excellent fruits. The animals are black cattle, horses, asses, deer, goats, hogs, civet-cats, and some very pretty green monkeys with black faces.

ST. JAGO, a handsome and considerable town of South America, the capital of Chili, with a good harbour, a bishop's see,

and a royal audience. It is seated in a large and beautiful plain, abounding with all the necessaries of life, at the foot of the Cordilleras, on the river Mapocho, which runs across it from east to west. Here are several canals and a dyke, by means of which they water the gardens and cool the streets.—It is very much subject to earthquakes. W. lon. 69. 35. S. lat. 33. 40.

ST. JAGO *de Cuba*, a town in North America, situated on the southern coast of the island of Cuba, in the bottom of a bay with a good harbour, and on a river of the same name. W. lon. 76. 44. N. lat. 20. 0.

JAGO *de los Caballeros*, a town of America, and one of the principal of the island of Hispaniola. It is seated on the river Yague, in a fertile soil, but bad air. W. lon. 70. 5. N. lat. 19. 40.

ST. JAGO *del Entero*, a town of South America, one of the most considerable of Tucuman, and the usual residence of the inquisitor of the province. It is seated on a large river, in a flat country, where there is game, tigers, guanacos, commonly called *camel sheep*, &c.

JAGO *de la Vega*, otherwise called *Spanish Town*, is the capital of the island of Jamaica, in the West Indies; and stands in 18. 1. north latitude, and 76. 45. west longitude. It is about a mile in length, and little more than a quarter of a mile in breadth; and contains between 500 and 600 houses, with about 4000 inhabitants of all colours and denominations. This town is situated in a delightful plain, on the banks of the Rio Cobre, 13 miles from Kingston, and 10 from Port Royal. It is the residence of the commander in chief: and here the supreme court of judicature is held, four times in the year, viz. on the last Tuesdays of February, May, August, and November, and sits three weeks.—St. Jago de la Vega is the county-town of Middlesex, and belongs to the parish of St. Catharine; in which parish there are 11 sugar-plantations, 108 pens, and other settlements, and about 10,000 slaves.

JAGODNA, a town of Turkey in Europe, in Servia, seated on the river Morava, 70 miles S. E. of Belgrade.

JAGUAR, or JAQUAR, a name given to the Brazilian Once, a species of FELIS. See FELIS.

JAGUEER, in East India affairs, any pension from the Grand Mogul, or king of Delhi; generally such as are assigned for military services.

JAGUEERDAR, the holder or possessor of a jagueer. It comes from three Persian words, *Ja* "a place;" *gueristun* "to take;" and *dyshun* "to hold;" *quasi* "a place-holder or pensioner." In the times of the Mogul empire, all the great officers of the court, called *amrabs*, were allowed jagueers, either in lands of which they collected the revenues, or assignments upon the revenues for specified sums, payable by the lord lieutenant of a province: which sums were for their maintenance, and the support of such troops as they were necessitated to bring into the field when demanded by the emperor, as the condition of their jagueers, which were always revokable at pleasure.

JAICZA, a town of Turkey in Europe, in the province of Bosnia, 50 miles N. E. of Bosna Serago, with a strong citadel, and seated on the river Plena.

JAIL-FEVER, a very dangerous fever of the contagious kind, arising from the putrescent disposition of the blood and juices. See MEDICINE.

JALAP, in botany and the materia medica, the root of a species of convolvulus or bind-weed. See CONVOLVULUS. This root is brought to us in thin transverse slices from Xalapa, a province of New Spain. Such pieces should be chosen as are most compact, hard, weighty, dark-coloured, and abound most with black circular striæ. Slices of bryony root are said to be sometimes mixed with those of jalap: these may be easily distinguished by their whiter colour and less compact texture. This root has no smell, and very little taste upon the tongue; but when

swallowed, it affects the throat with a sense of heat, and occasions a plentiful discharge of saliva. Jalap in substance, taken in a dose of about half a dram (less or more, according to the circumstances of the patient), proves an effectual, and in general a safe purgative, though it sometimes occasions nausea and gripes, like other strong cathartics. An extract made by water purges almost universally, but weakly; and at the same time has a considerable effect by urine. The root remaining after this process gripes violently, because the pure resinous part only is left. On the like principle, the pure resin prepared with spirit of wine occasions most violent gripings, and other distressing symptoms. Triturated with sugar, or with almonds into the form of an emulsion, or dissolved in spirit, and mixed with syrups, it purges plentifully in a small dose, without occasioning much disorder: the part of the jalap remaining after the separation of the resin yields to water an extract, which has no effect as a cathartic, but operates powerfully by urine. Nothing more effectually corrects the operation of jalap when given in powder than joining it with cream of tartar.

JALEMUS, in antiquity, a kind of mournful song, used upon occasion of death, or any other affecting accident. Hence the Greek proverbs had their original, *ιαλεμυ οικιοτερος*, or *ψυχροτερος*, i. e. *more sad or colder than a jalemus*, *εις της ιαλεμυς εγγραφτος*, *worthy to be ranked among jalemus*.

JAMA, a strong fort of Ingria, in the Russian government of St. Petersburg, seated on a river of the same name, 13 miles N. E. of Narva.

JAMADAR, an officer of horse or foot, in Hindostan. Also the head or superintendant of the Peons in the Sewaury, or train of any great man.

JAMAGOROD, a strong town of Ingria, in the Russian government of St. Petersburg, seated on the Jama, 12 miles N. E. of Narva. E. lon. 28. 3. N. lat. 59. 25.

JAMAICA, an island of the W. Indies, discovered by Christopher Columbus in 1494. It is situated in the Atlantic Ocean, about 4000 miles S. W. of England. It has the island of Hispaniola, at the distance of 30 leagues, to the east; Cuba, at about the same distance, to the north; the gulf of Honduras to the west; and Carthage, on the great continent of S. America, to the S. distant 145 leagues. It is about 150 miles in length, and 40 in breadth. It is of an oval figure, and grows narrow from the middle, till it terminates in two points at the extremities of the island. It contains upwards of 4,000,000 of acres, and is divided by a ridge of hills which run nearly from E. to W. from sea to sea. Here abundance of fine rivers take their rise, and flow from both sides in gentle streams, refreshing the valleys as they glide along, and furnishing the inhabitants with sweet and cool water. They are well stored with fish of various kinds, not known in Europe, but exceedingly good. However, they have eels and crawfish in great plenty, not unlike ours. None of these rivers are navigable, even for barges: but some of them are so large, that the sugars are carried upon them in canoes from the remote plantations to the sea side. They are so numerous, that it is impossible to describe them all, and some of them run under ground for a considerable space, particularly the Rio-Cobre and the Rio-Pedra. The mountains, and indeed the greatest part of the island, are covered with woods, which never lose their verdure, but look green at all times of the year; for here is an eternal spring. There are a thousand different kinds of trees adorning the brow of every hill, irregularly mixing their different branches, appearing in gay confusion, and forming groves and cool retreats. Among these are the *lignum vitæ*, the cedar, and the mahogany-trees. In the valleys are sugar-canes, and such a variety of fruit-trees as to make the country look like a paradise. But to balance this, there are dreadful alligators in the rivers; guanoes and galliwatps in the fens and marshes; and snakes and noxious animals in the moun-

tains. The longest day is about 13 hours; and about nine in the morning it is so intolerably hot, that it would be difficult to live, if the sea breezes did not arise to cool the air. Sometimes the nights are pretty cool, and there are great dews, which are looked upon as unwholesome, especially to new comers. There are two springs, or seasons for planting grain, and the year is distinguished into two seasons, which are the wet and dry; but the rains are not so frequent as they were formerly, which is supposed to be owing to the cutting down of the woods. The months of July, August, and September, are called the hurricane months, because then they are the most frequent; and there is lightning almost every night. There is not above a third part of the island inhabited, for the plantations are all by the sea-side. Here and there are savannas, or large plains, where the original natives used to plant their Indian corn, and which the Spaniards made use of for breeding their cattle; but these are now quite bare and barren. The gentlemen's houses are generally built low, being only one story, on account of the hurricanes and earthquakes; and the negroes' huts are made of reeds, and will hold only two or three persons. The common drink is Madeira wine, or rum punch. The common bread, or that which serves for it, is plantains, yams, and cassava-roots. The yams are like potatoes, only coarser, and of a much larger size. But in February 1793, by the benevolent directions of his Majesty, a great number of the bread fruit trees were brought here from Otaheite, by the Providence frigate, captain Bligh, in order to be introduced into the different plantations. Hogs are plentiful, and their mutton and lamb pretty good; but the servants generally feed upon Irish salt-beef, and the negroes have herrings and salt fish. The common dress of the men is linen drawers and waistcoats, thread stockings, and handkerchiefs tied round the head; but upon public occasions the gentlemen wear wigs, silk coats, and waistcoats, trimmed with silver. The ladies are richly dressed, and the servant-maids wear linen gowns. The current coin is all Spanish money, for that of the English is kept as a curiosity. The general produce of this island is sugar, rum, ginger, cotton, indigo, pimento, chocolate, several kinds of woods and medicinal drugs. They have some tobacco, which is but indifferent, and used only by the Negroes, who can scarce live without it. They have no sorts of European grain; but they have Indian corn, Guinea corn, and peas of various kinds (but none like ours), with variety of roots. Fruits are in great plenty, such as Seville and China oranges, common and sweet lemons, shaddocks, citrons, pomegranates, mammees, sweet sopas, papaws, pine-apples, star-apples, prickly pears, alicada pears, melons, pomplings, guavas, and many other sorts. The common distempers are, fevers, fluxes, and the dry gripes. There are four negroes to a white man; and of the former there are about 100,000, besides a mixed breed between the blacks, whites, and mulattoes. This island was taken by the English in 1655. The principal town is Kingston; but St. Jago de la Vega, or Spanish Town, is the seat of government. The centre of this island is in W. lon. 76. 45. N. lat. 18. 2.

JAMANA, a town of Asia, in Arabia Felix, capital of a principality that lies between Hagias, Oman, and Arabia Deserta, seated on the river Aftan, 150 miles W. of Elcatif.

JAMBI, or JAMBIS, a sea-port and small kingdom of Asia, on the eastern coast of the island of Sumatra. It is a trading place. The Dutch have a fort here, and export pepper hence, with the best sort of canes. It is 160 miles N. of Bencoolen. E. lon. 102. 35. N. lat. 0. 59.

JAMBIA VICUS. See YAMBRO.

IAMBIC, in ancient poetry, a sort of verse, so called from its consisting either wholly, or in great part, of iambuses. See IAMBUS. Ruddiman makes two kinds of iambic, viz. dimeter and trimeter; the former containing four feet, and the latter six.

And as to the variety of their feet, they consist wholly of iambuses, as in the two following verses of Horace:

1	2	3	4	5	6
Dim. Inar	sit æ	fluo	sius		
Trim. Suis	& i	p/a Ro	ma vi	ribus	ruit.

Or, a dactylus, spondeus, anapestus, and sometimes tribrachys, obtain in the odd places; and the tribrachys also in the even places, excepting the last. Examples of all which may be seen in Horace; as,

Dimeter.					
1	2	3	4	5	6
Canidi	a tra	clavit	dapes		
Vide	re prope	rantes	domum		

Trimeter.					
Quò quò scele si rui tis aut cur dex' teris.					
Prius quæ cœ lum si det in ferius mari.					
Aliti bus at que cani bus homi cid' He storem.					
Pavidum que lepo r' aut ad venam laqueo gruem.					

JAMBLICUS, the name of two celebrated Platonic philosophers, one of whom was of Colchis, and the other of Apamea in Syria. The first, whom Julian equals to Plato, was the disciple of Anatolius and Porphyry, and died under the reign of the emperor Constantine.—The second also enjoyed great reputation. Julian wrote several letters to him, and it is said he was poisoned under the reign of Valens. It is not known to which of the two we ought to attribute the works we have in Greek under the name of *Jamblicus*, viz. 1. The history of the life of Pythagoras, and the sect of the Pythagoreans. 2. An exhortation to the study of philosophy. 3. A piece against Porphyry's letter on the mysteries of the Egyptians.

JAMBOLIFERA, in botany; a genus of the monogynia order, belonging to the octandria class of plants; and in the natural method ranking with those of which the order is doubtful. The calyx is quadridented; the corolla tetrapetalous, and funnel-shaped; the filaments a little plane; the stigma simple.

IAMBUS, in the Greek and Latin prosody, a poetical foot; consisting of a short syllable followed by a long one; as in

Θεὸς λέγων, Δεῖ, μέας.

Syllaba longa brevi subiecta vocatur iambus, as Horace expresses it; who also calls the iambus a swift, rapid foot, *pes cilius*.

The word, according to some, took its rise from Iambus, the son of Pan and Echo, who invented this foot; or, perhaps, who only used sharp-biting expressions to Ceres, when afflicted for the death of Proserpine. Others rather derive it from the Greek *ios*, *venenum*, "poison;" or from *ιαμειζω maledico*, "I rail or revile;" because the verses composed of iambuses were at first only used in satire.

ST. JAMES of the Sword, (*San Jago del Espada*), a military order in Spain, instituted in 1170 under the reign of Ferdinand II. king of Leon and Galicia. Its end was to put a stop to the incursions of the Moors; these knights obliging themselves by a vow to secure the roads. An union was proposed and agreed to in 1170 between these and the canons of St. Eloy; and the order was confirmed by the pope in 1175. The highest dignity in that order is that of grand master, which has been united to the crown of Spain. The knights are obliged to make proof of their descent from families that have been noble for four generations on both sides; they must also make it appear, that their said ancestors have neither been Jews, Saracens, nor heretics; nor even to have been called in question by the Inquisition. The novices are obliged to serve six months in the galleys, and to live a month in a monastery. Heretofore they were truly religious, and took a vow of celibacy; but Alexander III. gave them a permission to marry. They now make no vows but of poverty, obedience, and conjugal fidelity; to which, since the year 1652, they have added that of defending the immacu-

late conception of the holy Virgin. Their habit is a white cloak, with a red cross on the breast. This is esteemed the most considerable of all the military orders in Spain: the king carefully preserves the office of grand-master in his own family, on account of the rich revenues and offices whereof it gives him the disposal. The number of knights is much greater now than formerly, all the grandees choosing rather to be received into this than into the order of the golden fleece; inasmuch as this puts them in a fair way of attaining to commands, and gives them many considerable privileges in all the provinces of Spain, but especially in Catalonia.

JAMES (Thomas), a learned English critic and divine, born about the year 1571. He recommended himself to the office of keeper of the public library at Oxford, by the arduous undertaking of publishing a catalogue of the MSS in each college library at both universities. He was elected to this office in 1602, and held it 18 years, when he resigned it to prosecute his studies with more freedom. In the convocation held with the parliament at Oxford in 1625, of which he was a member, he moved to have proper commissioners appointed to collate the MSS of the Fathers in all the libraries in England, with the Popish editions, in order to detect the forgeries in the latter; but this proposal not meeting with the desired encouragement, he engaged in the laborious task himself, which he continued until his death in 1629. He left behind him a great number of learned works.

JAMES (Richard), nephew of the former, entered into orders in 1615: but being a man of humour, of three sermons preached before the university, one concerning the observation of Lent was without a text, according to the most ancient manner; another against the text; and the third beside it. About the year 1619, he travelled through Wales, Scotland, Shetland, into Greenland and Russia, of which he wrote observations. He assisted Selden in composing his *Marmora Arundeliana*; and was very serviceable to Sir Robert Cotton; and his son Sir Thomas, in disposing and settling their noble library. He died in 1638; and has an extraordinary character given him by Wood for learning and abilities.

JAMES (Dr. Robert), an English physician of great eminence, and particularly distinguished by the preparation of a most excellent fever-powder, was born at Kinverston in Staffordshire, A. D. 1703: his father a major in the army, his mother a sister of Sir Robert Clarke. He was of St. John's college in Oxford, where he took the degree of A. B. and afterwards practised physic at Sheffield, Lichfield, and Birmingham successively. Then he removed to London, and became a licentiate in the college of physicians; but in what years we cannot say. At London he applied himself to writing as well as practising physic; and published a Medicinal Dictionary in 3 vols. folio, and many lesser works.

JAMES'S Powder, a medicine prepared by Dr. James, of which the basis has been long known to chemists, though the particular receipt for making it lay long concealed, till made public by Dr. Monro in his *Medical and Pharmaceutical Chemistry*. The following (Dr. Monro informs us) is a copy of the receipt, extracted from the Records of Chancery; the inventor, when he took out a patent for selling his powder, having sworn, in the most solemn manner, that it was the true and genuine receipt for preparing it:

'Take antimony, calcine it with a continued protracted heat, in a flat, unglazed earthen vessel, adding to it from time to time a sufficient quantity of any animal oil and salt, well dephlegmated; then boil it in melted nitre for a considerable time, and separate the powder from the nitre, by dissolving it in water.'

This extract Dr. Monro accompanies with the following observations. "When the Doctor first administered his powder,

he used to join one grain of the following mercurial preparation to thirty grains of his antimonial powder; but in the latter part of his life he often declared that he had long laid aside the addition of the mercurial. His mercurial, which he called a pill, appears by the records of chancery to have been made in the following manner: 'Purify quicksilver, by distilling it nine times from an amalgam, made with martial regulus of antimony, and a proportional quantity of sal ammoniac; dissolve this purified quicksilver in spirit of nitre, evaporate to dryness, calcine the powder till it becomes of a gold colour; burn spirits of wine upon it, and keep it for use.' Dr. James, at the end of the receipt given into chancery, says, 'The dose of these medicines is uncertain; but in general thirty grains of the antimonial and one grain of the mercurial is a moderate dose. Signed and sworn to by Robert James.'

There is the greatest reason to believe, however, that the medicine sold subsequent to the recording of this receipt in chancery, was not made conformably to it. From an analysis made by Dr. Higgins, the London college have introduced into their new Pharmacopœia, an imitation of Dr. James's powder under the title of *pulvis antimonialis*.

"It has been called Dr. James's Fever Powder (continues Dr. Monro), and many have believed it to be a certain remedy for fevers, and that Dr. James had cured most of the patients whom he attended, and who recovered, by the use of this powder. But the bark, and not the antimonial powder, was the remedy which Dr. James almost always trusted to for the cure of fevers: he gave his powders only to clear the stomach and bowels; and after he had effected that, he poured in the bark as freely as the patient could swallow it. The Doctor believed all fevers to be more or less of the intermitting kind; and that if there was a possibility of curing a fever, the bark was the remedy to effectuate the cure; for if the fever did not yield to that, he was sure that it would yield to no other remedy whatever, as he has more than once declared to me when I have attended patients in fevers along with him."

JAMES-Island, an island of Africa, 30 miles up the river Gambia, in the middle of the river, and three miles from its nearest shore. On this island, which is about a mile in circumference, the English have a fort and a considerable factory. W. long. 16. 0. N. lat. 13. 15.

JAMES-Island, an island of N. America, opposite Charleston in S. Carolina. It contains about 50 families.

JAMES-River, a fine river of Virginia, in N. America, which enters the bay of Chesapeake, near James-Town.

ST. JAMES, an hospital and burying-ground not far from Basil in Switzerland, and near the small river Birs. It is celebrated for a desperate combat fought by about 3000 Swiss against an army of 30,000 French, commanded by the dauphin, afterward Lewis XI. in which only 32 of the former remained alive, desperately wounded, on the field of battle. Sixteen that escaped from the field were branded with infamy, for not having sacrificed their lives in defence of their country. The conqueror himself, who was compelled to retire with his army into Alsace, declared that such another victory would ruin it.

JAMES-Town, a town of N. America, once the capital of Virginia, seated in a peninsula on the N. side of James River. W. lon. 76. 29. N. lat. 37. 3.

JAMES-Town, a borough of Ireland, in the county of Leitrim, five miles N. W. of Carrick on Shannon, and 73 N. W. of Dublin. W. lon. 8. 15. N. lat. 53. 44.

St. JAMES'S Day, a festival of the Christian church, observed on the 25th of July, in honour of St. James the greater, son of Zebedee.

Epistle of St. JAMES, a canonical book of the New Testament, being the first of the catholic or general epistles; which are so called, as not being written to one, but to several Christians.

tian churches. This general epistle is addressed partly to the believing and partly to the infidel Jews; and is designed to correct the errors, soften the ungoverned zeal, and reform the indecent behaviour of the latter; and to comfort the former under the great hardships they then did, or shortly were to suffer, for the sake of Christianity.

JAMESONE (GEORGE), an excellent painter, justly termed the *Vandyck of Scotland*, was the son of Andrew Jamesone, an architect; and was born at Aberdeen, 1586. He studied under Rubens, at Antwerp; and, after his return, applied with indefatigable industry to portraits in oil, though he sometimes practised in miniature, and also in history and landscapes. His largest portraits were somewhat less than life. His earliest works are chiefly on board, afterwards on a fine linen cloth, smoothly primed with a proper tone to help the harmony of his shadows. His excellence is said to consist in delicacy and softness, with a clear and beautiful colouring; his shades not charged, but helped by varnish, with little appearance of the pencil. When king Charles I. visited Scotland in 1633, the magistrates of Edinburgh, knowing his majesty's taste, employed this artist to make drawings of the Scottish monarchs; with which the king was so pleased, that, inquiring for the painter, he sat to him, and rewarded him with a diamond-ring from his own finger. It is observable, that Jamesone always drew himself with his hat on, either in imitation of his master Rubens, or on having been indulged in that liberty by the king when he sat to him. Many of Jamesone's works are in both the colleges of Aberdeen; and the Sybils there he is said to have drawn from living beauties in that city. His best works are from the year 1630 to his death, which happened at Edinburgh in 1644.

JAMETS, a town of France, in the department of Meuse, and late province of Barrois, 12 miles S. of Stenay.

JAMYN (AMAND), a celebrated French poet in the 16th century. He is esteemed the rival of Ronsard, who was his cotemporary and friend. He was secretary and chamber-reader in ordinary to Charles IX. and died about 1585. He wrote, 1. Poetical works, 2 vols. 2. Philosophical discourses to Pasicharis and Rodanthe, with seven academical discourses. 3. A translation of the Iliad of Homer, begun by Hugh Sabel, and finished by Jamyn; with a translation into French verse of the three first books of the Odyssey.

JANE of FLANDERS, a remarkable lady, who seems to have possessed in her own person all the excellent qualities of both sexes, was the wife of John de Mountfort, a competitor for the dukedom of Brittany upon the death of John III. This duke, dying without issue, left his dominions to his niece Jane, married to Charles de Blois nephew to the king of France; but John de Mountfort, brother to the late duke, though by a second marriage, claimed the duchy, and was received as successor by the people of Nantes. The greatest part of the nobility swore fealty to Charles de Blois, thinking him best supported. This dispute occasioned a civil war; in the course of which John was taken prisoner and sent to Paris. This misfortune would have entirely ruined his party, had not his interest been supported by the extraordinary abilities of his wife Jane of Flanders. Bold, daring, and intrepid, she fought like a warrior in the field; shrewd, sensible, and sagacious, she spoke like a politician in the council; and, endowed with the most amiable manners and winning address, she was able to move the minds of her subjects by the force of her eloquence, and mould them exactly according to her pleasure. She happened to be at Rennes when she received the news of her husband's captivity; but that disaster, instead of depressing her spirits, served only to rouse her native courage and fortitude. She forthwith assembled the citizens; and, holding in her arms her infant son, recommended him to their care and protection in the most pathetic terms, as

the male heir of their ancient dukes, who had always governed them with lenity and indulgence, and to whom they had ever professed the most zealous attachment. She declared herself willing to run all hazards with them in so just a cause; pointed out the resources that still remained in the alliance of England; earnestly beseeching them to make one vigorous effort against an usurper, who being forced upon them by the intrigues of France, would, as a mark of his gratitude, sacrifice the liberties of Brittany to his protector. The people, moved by the affecting appearance, and animated by the noble conduct of the princess, vowed to live and die with her in defending the rights of her family; and their example was followed by almost all the Bretons. The countess went from place to place, encouraging the garrisons of the several fortresses, and providing them with every thing necessary for their subsistence: after which she shut herself up with her son in Hennebion, where she resolved to wait for the succours which the king of England (Edward III.) had promised to send to her assistance. Charles de Blois, accompanied by the Dukes of Burgundy and Bourbon, and many other noblemen, took the field with a numerous army, and, having reduced Rennes, laid siege to Hennebion, which was defended by the countess in person. This heroine repulsed the assailants in all their attacks with the most undaunted courage; and observing one day that their whole army had left the camp to join in a general storm, she rushed forth at a postern gate, with three hundred horse, set fire to their tents and baggage, killed their sutlers and servants, and raised such a terror and consternation through all their quarters, that the enemy gave over their assault, and, getting betwixt her and the walls, endeavoured to cut off her retreat to the city. Thus intercepted, she put the spurs to her horse, and, without halting, galloped directly to Brest, which lay at the distance of two-and-twenty miles from the scene of action. There being supplied with a body of five hundred horse, she immediately returned, and, fighting her way through one part of the French camp, was received into Hennebion amidst the acclamations of the people. Soon after this the English succours appeared, and obliged the enemy to raise the siege.

JANEIRO, called also RIO JANEIRO, a province of Brazil in South America, seated between the tropic of Capricorn and 22° of S. lat. It is bounded on the north by the province of Spirito Sancto, on the east and south by the Atlantic Ocean, and on the west by the mountains which separate it from Guayra in Spanish America. This is the most valuable province which the Portuguese are masters of; for they import from thence yearly great quantities of gold and precious stones, which they find in the mountains to a prodigious value.

JANICULUM, or JANICULARIS, a hill of ancient Rome, added by Ancus Martius; the burial-place of Numa, and of Statius Cæcilius the poet: to the east and south, having the Tiber; to the west, the fields; to the north, a part of the Vatican. So called, either from an ancient city, (Virgil); or because it was a *janua*, or gate, from which to issue out and make incursions on the Tuscans, (Verrius Flaccus.) Now called *Mons Aureus*, corruptly *Montorius*, from its sparkling sands. From this hill, on account of its height, is the most extensive prospect of Rome; but it is less inhabited, because of its gross air; neither is it reckoned among the seven hills. Hither the people retired, and were hence afterwards recalled by Q. Hortensius the dictator. (Pliny.)

JANIZARIES, an order of infantry in the Turkish armies; reputed the grand seignior's foot-guards. Vossius derives the word from *geniziers*, which in the Turkish language signifies *novi homines* or *milites*. D'Herbelot tells us, that *jenitcheri* signifies a *new band*, or *troop*; and that the name was first given by Amurath I. called the *Conqueror*, who choosing out one fifth part of the Christian prisoners whom he had taken from

the Greeks, and instructing them in the discipline of war and the doctrines of their religion, sent them to Hagi Bektasche (a person whose pretended piety rendered him extremely revered among the Turks), to the end that he might confer his blessing on them, and at the same time give them some mark to distinguish them from the rest of the troops.—Bektasche, after blessing them in his manner, cut off one of the sleeves of the fur-gown which he had on, and put it on the head of the leader of this new militia; from which time, viz. the year of Christ 1361, they have still retained the name *jenitchebi*, and the fur-cap.

As, in the Turkish army, the European troops are distinguished from those of Asia; the janizaries are also distinguished into *janizaries of Constantinople*, and of *Damascus*. Their pay is from two aspers to twelve *per diem*; for when they have a child, or do any signal piece of service, their pay is augmented. Their dress consists of a dolyma, or long gown with short sleeves, which is given them annually by the grand seignior on the first day of Ramazan. They wear no turban; but, in lieu of that, a kind of cap which they call *zarcola*, and a long hood of the same stuff hanging on their shoulders. On solemn days they are adorned with feathers, which are stuck in a little case on the fore part of the bonnet.—Their arms, in Europe, in time of war, are a fabre, a carabine or musket, and a cartouch-box hanging on the left side. At Constantinople, in time of peace, they wear only a long staff in their hand. In Asia, where powder and fire-arms are more uncommon, they wear a bow and arrows, with a poignard, which they call *baniare*.—Though the janizaries are not prohibited marriage, yet they rarely marry, nor then but with the consent of their officers; as imagining a married man to make a worse soldier than a bachelor.—It was Osman, or Ottoman, or, as others will have it, Amurath, who first instituted the order of janizaries. They were at first called *jaja*, that is, footmen, to distinguish them from the other Turks, the troops whereof consisted mostly of cavalry. The number of janizaries is generally above 40,000; divided into 162 companies or chambers called *odas*, in which they live together at Constantinople as in a convent. They are of a superior rank to all other soldiers, and are also more arrogant and factious, and it is by them that the public tranquillity is mostly disturbed. The government may therefore be said to be in the hands of the janizaries. They have, however, some good qualities: they are employed to escort travellers, and especially ambassadors and persons of high rank, on the road; in which case, they behave with the utmost zeal and fidelity.

JANIZARIES, at Rome, are officers or pensioners of the pope, called also *participantes*, on account of certain rights or duties which they enjoy in the annates, bulls, or expeditions, and the Roman chancery.—Most authors are mistaken in the nature of their office: the truth is, they are officers of the third bench or college of the Roman chancery. The first bench consists of writers, the second of abbreviators, and the third of *janizaries*; who are a kind of correctors and revisers of the pope's bulls.

JANNA, a territory of Turkey in Europe, in Macedonia, bounded on the S. by Livadia, on the W. by Albania, and on the E. by the Archipelago. It is the Thessalia of the ancients, and Larissa is the capital.

JANNA, a town of Turkey in Europe, in the province of Janna. It is inhabited by rich Greek merchants, and is 62 miles W. of Larissa. E. lon. 21. 36. N. lat. 39. 44.

JANOWITZ, a town of Bohemia, in the circle of Kaushim, famous for a battle, in 1645, between the Swedes and the Imperialists, when the latter were defeated. It is 48 miles S. E. of Prague. E. lon. 15. 38. N. lat. 49. 45.

JANSEN (CORNELIUS), bishop of Ypres, one of the most learned divines of the 17th century, and principal of the sect called from his name *Jansenists*. He was born in Holland of

Catholic parents, and studied at Louvain. Being sent to transact some business of consequence relating to the university, into Spain, the Catholic king, viewing with a jealous eye the intriguing policy of France, engaged him to write a book to expose the French to the Pope as no good Catholics, since they made no scruple of forming alliances with Protestant states. Jansen performed this task in his *Mars Gallicus*; and was rewarded with a mitre, being promoted to the see of Ypres in 1635. He had, among other writings, before this, maintained a controversy against the Protestants upon the points of grace and predestination; but his *Augustinus* was the principal labour of his life, on which he spent above 20 years. See the next article.

JANSENISTS, in church-history, a sect of the Roman Catholics in France, who followed the opinions of Jansenius bishop of Ypres, and doctor of divinity of the universities of Louvain and Douay, in relation to grace and predestination. In the year 1640 the two universities just mentioned, and particularly father Molina and father Leonard Celsus, thought fit to condemn the opinions of the Jesuits on grace and free-will. This having set the controversy on foot, Jansenius opposed to the doctrine of the Jesuits the sentiments of St. Augustine; and wrote a treatise on grace, which he entitled *Augustinus*. This treatise was attacked by the Jesuits, who accused Jansenius of maintaining dangerous and heretical opinions; and afterwards, in 1642, obtained of pope Urban VIII. a formal condemnation of the treatise written by Jansenius: when the partisans of Jansenius gave out that this bull was spurious, and composed by a person entirely devoted to the Jesuits. After the death of Urban VIII. the affair of Jansenism began to be more warmly controverted, and gave birth to an infinite number of polemical writings concerning grace. And what occasioned some mirth, was the titles which each party gave to their writings; one writer published *The torch of St. Augustine*, another found *Snuffers for St. Augustine's torch*, and father Veron formed *A gag for the Jansenists*, &c. In the year 1650, 68 bishops of France subscribed a letter to pope Innocent X. to obtain an inquiry into and condemnation of the five following propositions, extracted from Jansenius's *Augustinus*: 1. Some of God's commandments are impossible to be observed by the righteous, even though they endeavour with all their power to accomplish them. 2. In the state of corrupted nature, we are incapable of resisting inward grace. 3. Merit and demerit, in a state of corrupted nature, does not depend on a liberty which excludes necessity, but on a liberty which excludes constraint. 4. The Semipelagians admitted the necessity of an inward preventing grace for the performance of each particular act, even for the beginning of faith; but they were heretics in maintaining that this grace was of such a nature, that the will of man was able either to resist or obey it. It is Semipelagianism to say, that Jesus Christ died, or shed his blood, for all mankind in general.

In the year 1652 the pope appointed a congregation for examining into the dispute in relation to grace. In this congregation Jansenius was condemned; and the bull of condemnation, published in May 1653, filled all the pulpits in Paris with violent outcries and alarms against the heresy of the Jansenists. In the year 1656 pope Alexander VII. issued out another bull, in which he condemned the five propositions of Jansenius. However, the Jansenists affirm, that these propositions are not to be found in this book; but that some of his enemies, having caused them to be printed on a sheet, inserted them in the book, and thereby deceived the pope. At last Clement XI. put an end to the dispute by his constitution of July 17, 1705; in which, after having recited the constitutions of his predecessors in relation to this affair, he declares, "That in order to pay a proper obedience to the papal constitutions concerning the present question, it is necessary to receive them

with a respectful silence." The clergy of Paris, the same year, approved and accepted this bull, and none dared to oppose it. This is the famous bull *Unigenitus*, so called from its beginning with the words *Unigenitus Dei Filius*, &c. which occasioned so much confusion in France.

JANSSENS (ABRAHAM), history-painter, was born at Antwerp in 1569. He was cotemporary with Rubens, and also his competitor, and in many of the finest parts of the art was accounted not inferior to that celebrated master. It is reported, that having wasted his time and his substance by a life of dissipation and pleasure, and falling into necessitous circumstances, which he imputed more to ill fortune than to his own neglect of his business, he grew envious at the grandeur in which Rubens appeared, and impatient at his merit and success; and with peevish insolence challenged him to paint a picture with him only for fame, which he was willing to submit to impartial judges. But Rubens rejected the proposal, answering with modesty, that he freely submitted to him, and the world would certainly do justice to them both. Sandrart, who had seen several of his works, assures us, that he not only gave a fine roundness and relief to his figures, but also such a warmth and clearness to the carnations, that they had all the look of real flesh: and his colouring was as durable as it was beautiful, retaining its original lustre for a number of years. His most capital performance is said to be a resurrection of Lazarus, which is in the cabinet of the Elector Palatine, and is an object of admiration to all who behold it.

JANSSENS (VICTOR HONORIUS), history-painter, was born at Brussels in 1664, and was a disciple of one Volders, under whose direction he continued for seven years; in which time he gave many proofs of a genius far superior to those who were instructed in the same school. He afterwards went to Rome, where he attended particularly to the works of Raphael; he designed after the antiques, and sketched the beautiful scenes around that city; and in a short time his paintings rose in esteem, and the principal nobility of Rome were desirous to employ him. He associated with Tempesta, the celebrated landscape painter, for several years, and painted the figures in the works of that great master as long as they resided together.

Janssens composed historical subjects, both in a small and a large size; but he found the demand for his small pictures so considerable, that he was induced to paint most frequently in that size. During 11 years he continued at Rome, which barely sufficed for his finishing those pictures for which he was engaged; nor could he have been even then at his liberty, had he not limited himself to a number, and determined not to undertake more.—Returning to Brussels, his performances were as much admired there as they had before been in Italy; but having married, and gradually become the father of 11 children, he was compelled to change his manner of painting in small, and to undertake only those of the large kind, as being more lucrative, more expeditious, and also more agreeable to his genius and inclination. He adorned most of the churches and palaces of his own country with his compositions.—The invention of this artist was fruitful; he designed correctly, his colouring is natural and pleasing, his pencil free, and the airs of his heads have beauty and elegance. As to the difference between his large and small paintings, it is observed, that in correctness and taste they had an equal degree of merit; but the colouring of the former appears more raw and cold than the colouring of the latter; and it is agreed that, for small historical pictures, he was preferable to all the painters of his time.

JANSSEN (CORNELIUS) called *Johnson*, an eminent painter of portraits, was born at Amsterdam (though in the Chronological Tables, and in Sandrart, it is improperly asserted that he was born in London), and he resided in England for several years; where he was engaged in the service of king James I. and

painted several excellent portraits of that monarch, as also of his children and of the principal nobility of his court. He had not the freedom of hand, nor the grace of Vandyck; but in other respects he was accounted his equal, and in the finishing his pictures superior. His paintings are easily distinguished by their smooth, clear, and delicate tints, and by that character of truth and nature with which they are strongly marked. He generally painted on board; and, for the most part, his draperies are black; probably because the opposition of that tint made his flesh colours appear more beautifully bright, especially in his female figures. It is said that he used a quantity of ultra-marine in the black colours, as well as in his carnations; which may be one great cause of their preserving their original lustre even to this day. Frequently he painted in a small size in oil, and often copied his own works in that manner: His fame began to be, somewhat obscured, on the arrival of Vandyck in England; and the civil war breaking out some time after, induced him to return to his own country, where his paintings were in the highest esteem. He died in 1683.

ST. JANUARIUS, the patron saint of Naples, where his head is occasionally carried in procession, in order to stay the eruption of Vesuvius. The liquefaction of his blood is a famous miracle at Naples. The saint suffered martyrdom about the end of the third century. When he was beheaded, a pious lady of Naples caught about an ounce of his blood, which has been carefully preserved in a bottle ever since, without having lost a single grain of its weight. This, of itself, were it equally demonstrable, might be considered as a greater miracle than the circumstance on which the Neapolitans lay the whole stress, viz. that the blood, which has congealed, and acquired a solid form by age, is no sooner brought near the head of the saint, than, as a mark of veneration, it immediately liquefies. This experiment is made three different times every year, and is considered by the Neapolitans as a miracle of the first magnitude. The substance in the bottle, which is exhibited for the blood of the saint, is a sort of red size somewhat solid, but which melts with a small degree of heat. When it is first brought out of the cold chapel, it is in its natural solid state; but when brought before the saint by the priest, and rubbed between his warm hands, and breathed upon for some time, it melts; and this is the whole mystery.

The head and blood of the saint are kept in a kind of press with folding doors of silver, in the chapel of St. Januarius belonging to the cathedral church. The real head is probably not so fresh, and well preserved, as the blood. On that account it is not exposed to the eyes of the public; but is inclosed in a large silver bust, gilt and enriched with jewels of high value. This being what appears to the people, their idea of the saint's features and complexion is taken entirely from the bust.—The blood is kept in a small repository by itself.

JANUARY, the name of the first month of the year, according to the computation now used in the west. The word is derived from the Latin *Januarius*, a name given it by the Romans, from Janus, one of their divinities, to whom they attributed two faces, because on the one side the first day of January looked towards the new year, and on the other towards the old one. The word *Januarius* may also be derived from *janua* "gate;" in regard this month, being the first, is, as it were, the gate of the year.

January and February were introduced into the year by Numa Pompilius; Romulus's year beginning in the month of March.—The kalends, or first day of this month, was under the protection of Juno, and in a peculiar manner consecrated to Janus by an offering of a cake made of new meal and new salt, with new frankincense and new wine. On the first day of January, a beginning was made of every intended work, the consuls elect

took possession of their office, who, with the flamens, offered sacrifices and prayers for the prosperity of the empire. On this day all animosities were suspended, and friends gave and received new-year's gifts, called *Strenæ*. On this day too the Romans above all things took care to be merry and divert themselves, and oftentimes such a scene of drunkenness was exhibited that they might with propriety enough have distinguished it by the name of *All-fools day*. The Christians heretofore fasted on the first day of January, by way of opposition to the superstitions and debaucheries of the heathens.

JANUS, in heathen worship, the first king of Italy, who, it is said, received Saturn into his dominions after his being driven from Arcadia by Jupiter. He tempered the manners of his subjects, and taught them civility; and from him they learned to improve the vine, to sow corn, and to make bread. After his death he was adored as a god. This deity was thought to preside over all new undertakings. Hence, in all sacrifices, the first libations of wine and wheat were offered to Janus, all prayers prefaced with a short address to him; and the first month of the year was dedicated to, and named from him. See JANUARY. Janus was represented with two faces, either to denote his prudence, or that he views at once the past and approaching years; he had a sceptre in his right hand, and a key in his left, to signify his extensive authority and his invention of locks. Though this is properly a Roman deity, the abbé La Pluche represents it as derived from the Egyptians, who made known the rising of the dog star, which opened their solar year, with an image with a key in its hand and two faces, one old and the other young, to typify the old and new year.

Temple of JANUS, in ancient history, a square building at Rome (as some say) of entire brass, erected by Romulus, and so large as to contain a statue of Janus five feet high, with brazen gates on each side, which were always kept open in time of war, and shut in time of peace. But the Romans were so much engaged in war, that this temple was shut only twice from the foundation of Rome till the reign of Augustus, and six times afterwards. It was first shut during the long reign of Numa, who instituted this ceremony. 2. In the year of the city 519, after the end of the first Punic war. 3. By Augustus, after the battle of Actium, in the year of Rome 725. 4. On Augustus's return from the war which he had against the Cantabrians in Spain, in the year of Rome 729. 5. Under the same emperor, in 744, about five years before the birth of Christ, when there was a general peace throughout the whole Roman empire, which lasted 12 years. 6. Under Nero, 811. 7. Under Vespasian, 824. 8. Under Constantius, when, upon Magnentius's death, he was left sole possessor of the empire, 1105. Some dispute the authority on which it is said to have been shut by Constantius, and say that the last time of its being shut was under Gordian, about the year of Rome 994. Virgil gives us a noble description of this custom, *Æn.* lib. iii. ver. 607, &c. The origin of this custom is not certainly known.

JANUS was also the name of a street in Rome, inhabited for the most part by bankers and usurers. It was so called from two statues of Janus which were erected there, one at the top, the other at the bottom of the street. The top of the street was therefore called *Janus Summus*, the bottom *Janus Imus*, and the middle *Janus Medius*. Hence Horace, lib. i. Epist. i.

*Hæc Janus summus ab imo
Perdocet—*

and Sat. 3. lib. 2.

*—Postquam omnis res mea Janum
Ad medium fracta est.*

JAPAN, a large country in the most eastern part of Asia, with the title of an empire. It is composed of several islands, the principal of which is called Nippon. It was discovered in

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1542, by the Portuguese, who were cast on shore by a tempest. The whole empire is divided into seven principal countries, which are subdivided into 70 provinces. It is the richest country in the world for gold, and the air and water are very good. It produces a great deal of rice, which they reap in September; millet, wheat, and barley, which they get in in May. Cedars are common, and so large that they are proper for the masts of ships and columns for temples. They have a large quantity of porcelain, silk, and skins; as also red pearls, which are not in less esteem than the white. In short, Japan is accounted one of the best countries in Asia. The inhabitants are naturally ingenious, and have a happy memory; but their manners are diametrically opposite to those of the Europeans. Our common drinks are cold, and theirs are all hot; we uncover the head out of respect, and they the feet; we are fond of white teeth, and they of black; we get on horseback on the left side, and they on the right; and they have a language so peculiar that it is understood by no other nation. The sciences are highly esteemed among them, and they have several schools at different places. Those they study most, are, arithmetic, rhetoric, poetry, history, and astronomy. Some of their schools at Meaco have each 3 or 4000 scholars. They treat the women with great severity, and punish adultery with death; yet a man may take as many wives as he pleases. The Japanese are naturally good soldiers, and skilful at shooting with a bow: however, as they inhabit nothing but islands, they are seldom at war with their neighbours. They formerly carried on a trade with the neighbouring countries, but now all communication with others is forbidden, especially with Christians; for they do not look upon the Dutch to be such. Their emperor is called Dairo; and in the minority of one of them, in 1150, when they had civil wars, one of the competitors for the crown assumed the ecclesiastical government, retaining the same title; while the other, who ruled in civil affairs, was called Cuba; and things have remained on the same footing to this day. The Dairo is the chief emperor, and confers the dignity upon the other, as if he were his vassal. He resides at Meaco, and has no lands: but he has a right of selling titles and dignities; and the idolatrous priests make great contributions. He wears a black habit, and a cap upon his head. His feet must never touch the ground, nor must he ever be exposed to the rays of the sun. He never cuts his hair, nor his beard, nor his nails; and all his victuals must be dressed in new vessels. When he goes abroad, he is carried by 14 men in a litter surrounded with curtains, so that he may see and not be seen. He has generally twelve wives (each of whom has a palace), with singing and dancing women for his diversion. He has also an unlimited number of concubines. His palace is adorned with 365 idols. The religion of the whole country is paganism; but there are two different sects. There were once a great number of Christians in different parts of the empire; but in 1638 they underwent great persecutions, insomuch that they were all extirpated. The cause of this was the opposition of the priests; the haughty behaviour of the Portuguese, they not allowing several wives; and the persuasions of the Dutch, who told them that their emperor would become a slave to the pope. The emperor of Japan is a sovereign monarch, and all the petty kings are his vassals. His army generally consists of 100,000 foot, and 20,000 horse, exclusive of those maintained by his vassals. His ordinary revenue is immense. The palace of the emperor is at Jeddo in the island of Nippon, and it is the capital of the whole. The only Europeans that trade with Japan are the Dutch; and whenever their ships arrive, they take away their guns, sails, and helms, and carry them on shore till they are ready to return back. In the absence of the ships, the factors are shut up in a small peninsula, and are not suffered so much as to have a lighted candle in their houses in the night-time. The merchandize which the Dutch carry to Japan are

spices, sugar, silks, linen and woollen cloth, elephant's teeth, and haberdashery wares; for which they receive gold, silver, cabinets, and other japanned and lackered wares. The Japanese have neither tables, beds, nor chairs; but they sit and lie on carpets and mats, in the manner of the Turks.

JAPAN *Earth*. See MIMOSA and TERRA *Japonica*.

JAPANNING, the art of varnishing and drawing figures on wood, in the same manner as is done by the natives of Japan in the East Indies. The substances which admit of being japanned are almost every kind that are dry and rigid, or not too flexible; as wood, metals, leather, and paper prepared.

Wood and metals do not require any other preparation, but to have their surface perfectly even and clean: but leather should be securely strained either on frames or on boards; as its bending or forming folds would otherwise crack and force off the coats of varnish; and paper should be treated in the same manner, and have a previous strong coat of some kind of size; but it is rarely made the subject of japanning till it is converted into *papier maché*, or wrought by other means into such form that its original state, particularly with respect to flexibility, is lost.

One principal variation from the method formerly used in japanning is, the using or omitting any priming or undercoat on the work to be japanned. In the older practice, such priming was always used; and is at present retained in the French manner of japanning coaches, and snuff-boxes of the *papier maché*, but in the Birmingham manufacture here it has been always rejected. The advantage of using such priming or undercoat is, that it makes a saving in the quantity of varnish used; because the matter of which the priming is composed fills up the inequalities of the body to be varnished, and makes it easy, by means of rubbing and water-polishing, to gain an even surface for the varnish: and this was therefore such a convenience in the case of wood, as the giving a hardness and firmness to the ground was also in the case of leather, that it became an established method; and is therefore retained, even in the instance of the *papier maché*, by the French, who applied the received method of japanning to that kind of work on its introduction. There is nevertheless this inconvenience always attending the use of an undercoat of size, that the japan coats of varnish and colour will be constantly liable to be cracked and peeled off by any violence, and will not endure near so long as the bodies japanned in the same manner, but without any such priming; as may be easily observed on comparing the wear of the Paris and Birmingham snuff-boxes; which latter, when good of their kind, never peel or crack, or suffer any damage, unless by great violence, and such a continued rubbing as wastes away the substance of the varnish; while the Japan coats of the Parisian crack and fly off in flakes, whenever any knock or fall, particularly near the edges, exposes them to be injured. But the Birmingham manufacturers, who originally practised the japanning only on metals, to which the reason above given for the use of priming did not extend, and who took up this art of themselves as an invention, of course omitted at first the use of any such undercoat; and not finding it more necessary in the instance of *papier maché*, than on metals, continue still to reject it. On this account the boxes of their manufacture are, with regard to the wear, greatly better than the French.

The laying on the colours in gum-water, instead of varnish, is also another variation from the method of japanning formerly practised; but the much greater strength of the work, where they are laid on in varnish or oil, has occasioned this way to be exploded with the greatest reason in all regular manufactures: however, they who may practise japanning on cabinets, or other such pieces as are not exposed to much wear and violence, for their amusement only, and consequently may not find it worth their while to encumber themselves with the preparations

necessary for the other methods, may paint with water colours on an undercoat laid on the wood or other substance of which the piece to be japanned is formed; and then finish with the proper coats of varnish, according to the methods below taught: and if the colours are tempered with the strongest isinglass size and honey, instead of gum water, and laid on very flat and even, the work will not be much inferior in appearance to that done by the other method, and will last as long as the old japan.

Of JAPAN *Grounds*.—The proper grounds are either such as are formed of the varnish and colour, where the whole is to remain of one simple colour; or by the varnish either coloured or without colour, on which some painting or other decoration is afterwards to be laid. It is necessary, however, before we proceed to speak of the particular grounds, to shew the manner of laying on the priming or undercoat, where any such is used.

This priming is of the same nature with that called *cl ar-coating*, or vulgarly *clear-coaling*, practised erroneously by the house-painters; and consists only in laying on and drying in the most even manner, a composition of size and whiting, or sometimes lime instead of the latter. The common size has been generally used for this purpose; but where the work is of a nicer kind, it is better to employ the glover's or the parchment size; and if a third of isinglass be added, it will be still better, and, if not laid on too thick, much less liable to peel and crack. The work should be prepared for this priming, by being well smoothed with the fish-skin or glass-shaver; and being made thoroughly clean, should be brushed over once or twice with hot size, diluted with two thirds of water, if it be of the common strength. The priming should then be laid on with a brush as even as possible; and should be formed of a size whose consistence is betwixt the common kind of glue, mixed with as much whiting as will give it a sufficient body of colour to hide the surface of whatever it is laid upon, but not more.

If the surface be very clean on which the priming is used, two coats of it laid on in this manner will be sufficient: but if, on trial with a fine wet rag, it will not receive a proper water polish on account of any inequalities not sufficiently filled up and covered, two or more coats must be given it; and whether a greater or less number be used, the work should be smoothed, after the last coat but one is dry, by rubbing it with the Dutch rushes. When the last coat is dry, the water polish should be given, by passing over every part of it with a fine rag, gently moistened, till the whole appear perfectly plain and even. The priming will then be completed, and the work ready to receive the painting or coloured varnish; the rest of the proceedings being the same in this case as where no priming is used.

When wood or leather is to be japanned, and no priming is used, the best preparation is to lay two or three coats of coarse varnish composed in the following manner: "Take of rectified spirit of wine one pint, and of coarse seed-lac and resin each two ounces. Dissolve the seed-lac and resin in the spirit; and then strain off the varnish." This varnish, as well as all others formed of spirit of wine, must be laid on in a warm place; and, if it can be conveniently managed, the piece of work to be varnished should be made warm likewise; and for the same reason all dampness should be avoided; for either cold or moisture chills this kind of varnish, and prevents its taking proper hold of the substance on which it is laid.

When the work is so prepared, or by the priming with the composition of size and whiting above described, the proper japan ground must be laid on, which is much the best formed of shell-lac varnish and the colour desired, if white be not in question, which demands a peculiar treatment, or great brightness be not required, when also other means must be pursued.

The colours used with the shell-lac varnish may be any pigments whatever, which give the tint of the ground desired: and

they may be mixed together to form browns or any compound colours.

As metals never require to be undercoated with whiting, they may be treated in the same manner as wood or leather, when the undercoat is omitted, except in the instances particularly spoken of below.

White JAPAN Grounds.—The forming a ground perfectly white, and of the first degree of hardness, remains hitherto a desideratum, or matter sought for, in the art of Japanning, as there are no substances, which form a very hard varnish, but what have too much colour not to deprave the whiteness when laid on of a due thickness over the work.

The nearest approach, however, to a perfect white varnish, already known, is made by the following composition :

“Take flake white, or white lead, washed over and ground up with a sixth of its weight of starch, and then dried ; and temper it properly for spreading with the mastich varnish prepared as under the article VARNISH.

“Lay these on the body to be japanned, prepared either with or without the undercoat of whiting, in the manner as above ordered ; and then varnish it over with five or six coats of the following varnish :

“Provide any quantity of the best feed-lac ; and pick out of it all the clearest and whitest grains, reserving the more coloured and fouler parts for the coarse varnishes, such as that used for priming or preparing wood or leather. Take of this picked feed-lac two ounces, and of gum-animi three ounces ; and dissolve them, being previously reduced to a gross powder, in about a quart of spirit of wine, and strain off the clear varnish.”

The feed-lac will yet give a slight tinge to this composition, but cannot be omitted where the varnish is wanted to be hard ; though, when a softer will answer the end, the proportion may be diminished, and a little crude turpentine added to the gum-animi, to take off the brittleness.

A very good varnish, free entirely from all brittleness, may be formed by dissolving as much gum-animi as the oil will take in old nut or poppy oil ; which must be made to boil gently when the gum is put into it. The ground of white colour itself may be laid on in this varnish, and then a coat or two of it may be put over the ground ; but it must be well diluted with oil of turpentine when it is used. This, though free from brittleness, is nevertheless liable to suffer by being indented or bruised by any slight strokes ; and it will not well bear any polish, but may be brought to a very smooth surface without, if it be judiciously managed in the laying it on. It is likewise somewhat tedious in drying, and will require some time where several coats are laid on ; as the last ought not to contain much oil of turpentine.

Blue JAPAN Grounds.—Blue japan grounds may be formed of bright Prussian blue, or of verditer glazed over by Prussian blue, or of smalt. The colour may be best mixed with shell-lac varnish, and brought to a polishing state by five or six coats of varnish of seed-lac ; but the varnish, nevertheless, will somewhat injure the colour by giving to a true blue a cast of green, and fouling in some degree a warm blue by the yellow it contains : where, therefore, a bright blue is required, and a less degree of hardness can be dispensed with, the method before directed in the case of white grounds must be pursued.

Red JAPAN Grounds.—For a scarlet japan ground, vermilion may be used : but the vermilion has a glaring effect, that renders it much less beautiful than the crimson produced by glazing it over with carmine or fine lake ; or even with rose-pink, which has a very good effect used for this purpose. For a very bright crimson, nevertheless, instead of glazing with carmine, the Indian lake should be used, dissolved in the spirit of which the varnish is compounded, which it readily admits of when

good : and, in this case, instead of glazing with the shell-lac varnish, the upper or polishing coats need only be used ; as they will equally receive and convey the tinge of the Indian lake, which may be actually dissolved by spirit of wine : and this will be found a much cheaper method than the using carmine. If, nevertheless, the highest degree of brightness be required, the white varnishes must be used.

Yellow JAPAN Grounds.—For bright yellow grounds, the king's yellow or the turpeth mineral should be employed, either alone, or mixed with fine Dutch pink : and the effect may be still more heightened by dissolving powdered turmeric root in the spirit of wine, of which the upper or polishing coat is made ; which spirit of wine must be strained from off the dregs before the feed-lac be added to it to form the varnish.

The feed-lac varnish is not equally injurious here, and with greens, as in the case of other colours ; because, being only tinged with a reddish yellow, it is little more than an addition to the force of the colours.

Yellow grounds may likewise be formed of the Dutch pink only ; which, when good, will not be wanting in brightness, though extremely cheap.

Green JAPAN Grounds.—Green grounds may be produced by mixing the king's yellow and bright Prussian blue, or rather the turpeth mineral and Prussian blue ; and a cheap but fouler kind by verdegris, with a little of the above-mentioned yellows, or Dutch pink. But where a very bright green is wanted, the crystals of verdegris, called *distilled verdegris*, should be employed ; and to heighten the effect they should be laid on a ground of leaf-gold, which renders the colour extremely brilliant and pleasing.

They may, any of them, be used successfully with good feed-lac varnish, for the reason before given ; but will be still brighter with white varnish.

Orange-coloured JAPAN Grounds.—Orange-coloured japan grounds may be formed by mixing vermilion or red lead with king's yellow or Dutch pink ; or the orange lac, which will make a brighter orange ground than can be produced by any mixture.

Purple JAPAN Grounds.—Purple japan grounds may be produced by the mixture of lake and Prussian blue ; or a fouler kind, by vermilion and Prussian blue. They may be treated as the rest with respect to the varnish.

Black JAPAN Grounds to be produced without Heat.—Black grounds may be formed by either ivory-black or lamp-black : but the former is preferable where it is perfectly good.

These may be always laid on with shell-lac varnish ; and have their upper or polishing coats of common feed-lac varnish, as the tinge or foulness of the varnish can be here no injury.

Common Black JAPAN Grounds on Iron or Copper, produced by means of Heat.—For forming the common black japan grounds by means of heat, the piece of work to be japanned must be painted over with drying oil ; and when it is of a moderate dryness, must be put into a stove of such degree of heat as will change the oil to black, without burning it so as to destroy or weaken its tenacity. The stove should not be too hot when the work is put into it, nor the heat increased too fast ; either of which errors would make it blister : but the slower the heat is augmented, and the longer it is continued, provided it be restrained within the due degree, the harder will be the coat of japan. This kind of varnish requires no polish, having received, when properly managed, a sufficient one from the heat.

The fine Tortoise-shell JAPAN Ground produced by means of Heat.—The best kind of tortoise-shell ground produced by heat is not less valuable for its great hardness, and enduring to be made hotter than boiling water without damage, than for its beautiful appearance. It is to be made by means of a var-

nish prepared in the following manner:—"Take of good linseed-oil one gallon, and of umbre half a pound: boil them together till the oil become very brown and thick: strain it then through a coarse cloth, and set it again to boil; in which state it must be continued till it acquire a pitchy consistence; when it will be fit for use."

Having prepared thus the varnish, clean well the iron or copper plate or other piece which is to be japanned; and then lay vermilion tempered with shell-lac varnish, or with drying oil diluted with oil of turpentine, very thinly, on the places intended to imitate the more transparent parts of the tortoise-shell. When the vermilion is dry, brush over the whole with the black varnish, tempered to a due consistence with oil of turpentine; and when it is set and firm, put the work into a stove, where it may undergo a very strong heat, and must be continued a considerable time; if even three weeks, or a month, it will be the better.

This was given amongst other receipts by Kunckel; but appears to have been neglected till it was revived with great success in the Birmingham manufactures, where it was not only the ground of snuff-boxes, dressing-boxes, and other such lesser pieces, but of those beautiful tea-waiters which have been so justly esteemed and admired in several parts of Europe where they have been sent. This ground may be decorated with painting and gilding, in the same manner as any other varnished surface, which had best be done after the ground has been duly hardened by the hot stove; but it is well to give a second annealing with a more gentle heat, after it is finished.

Method of painting JAPAN Work.—Japan work ought properly to be painted with colours in varnish; though, in order for the greater dispatch, and, in some very nice works in small, for the freer use of the pencil, the colours are sometimes tempered in oil; which should previously have a fourth part of its weight of gum-animi dissolved in it; or, in default of that, of the gums sandarac or mastich. When the oil is thus used, it should be well diluted with spirit of turpentine, that the colours may be laid more evenly and thin; by which means, fewer of the polishing or upper coats of varnish become necessary.

In some instances, water-colours are laid on grounds of gold, in the manner of other paintings; and are best, when so used, in their proper appearance, without any varnish over them; and they are also sometimes so managed as to have the effect of embossed work. The colours employed in this way, for painting, are best prepared by means of isinglass size corrected with honey or sugar-candy. The body of which the embossed work is raised, need not, however, be tinged with the exterior colour, but may be best formed of very strong gum-water, thickened to a proper consistence by bole-armenian and whiting in equal parts; which being laid on the proper figure, and repaired when dry, may be then painted with the proper colours tempered in the isinglass size, or in the general manner with shell-lac varnish.

Manner of Varnishing JAPAN Work.—The last and finishing part of japanning lies in the laying on and polishing the outer coats of varnish; which are necessary, as well in the pieces that have only one simple ground of colour, as with those that are painted. This is in general best done with common seed-lac varnish, except in the instances and on those occasions where we have already shown other methods to be more expedient: and the same reasons which decide as to the fitness or impropriety of the varnishes, with respect to the colours of the ground, hold equally with regard to those of the painting; for where brightness is the most material point, and a tinge of yellow will injure it, seed-lac must give way to the whiter gums; but where hardness and a greater tenacity are most essential, it must be adhered to; and where both are so necessary that it is proper

one should give way to the other in a certain degree reciprocally, a mixed varnish must be adopted.

This mixed varnish, as we have already observed, should be made of the picked seed-lac. The common seed-lac varnish, which is the most useful preparation of the kind hitherto invented, may be thus made:—"Take of seed-lac three ounces, and put it into water to free it from the sticks and filth that are frequently intermixed with it; and which must be done by stirring it about, and then pouring off the water, and adding fresh quantities in order to repeat the operation, till it be freed from all impurities, as it very effectually may be by this means. Dry it then, and powder it grossly, and put it, with a pint of rectified spirit of wine, into a bottle of which it will not fill above two-thirds. Shake the mixture well together; and place the bottle in a gentle heat, till the seed appear to be dissolved; the shaking being in the mean time repeated as often as may be convenient: and then pour off all that can be obtained clear by this method, and strain the remainder through a coarse cloth. The varnish thus prepared must be kept for use in a bottle well stoped."

When the spirit of wine is very strong, it will dissolve a greater proportion of the seed-lac: but this will saturate the common, which is seldom of a strength sufficient for making varnishes in perfection. As the ch'ling, which is the most inconvenient accident attending those of this kind, is prevented, or produced more frequently, according to the strength of the spirit; we shall therefore take this opportunity of showing a method by which weaker rectified spirits may with great ease at any time be freed from the phlegm, and rendered of the first degree of strength.

"Take a pint of the common rectified spirit of wine, and put it into a bottle of which it will not fill above three parts. Add to it half an ounce of pearl-ashes, salt of tartar, or any other alkaline salt, heated red hot, and powdered as well as it can be without much loss of its heat. Shake the mixture frequently for the space of half an hour; before which time, a great part of the phlegm will be separated from the spirit, and will appear, together with the undissolved part of the salts, in the bottom of the bottle. Let the spirit then be poured off, or freed from the phlegm and salts, by means of a tritorium or separating funnel; and let half an ounce of the pearl-ashes, heated and powdered as before, be added to it, and the same treatment repeated. This may be done a third time, if the quantity of phlegm separated by the addition of the pearl-ashes appear considerable. An ounce of alum reduced to powder and made hot, but not burnt, must then be put into the spirit, and suffered to remain some hours; the bottle being frequently shaken: after which, the spirit, being poured off from it, will be fit for use."

The addition of the alum is necessary, to neutralize the remains of the alkaline salt or pearl-ashes; which would otherwise greatly deprave the spirit with respect to varnishes and laquer, where vegetable colours are concerned; and must consequently render another distillation necessary.

The manner of using the seed-lac or white varnishes is the same, except with regard to the substance used in polishing; which, where a pure white or great clearness of other colours is in question, should be itself white: whereas the browner sorts of polishing dust, as being cheaper, and doing their business with greater dispatch, may be used in other cases. The pieces of work to be varnished should be placed near a fire, or in a room where there is a stove, and made perfectly dry; and then the varnish may be rubbed over them by the proper brushes made for that purpose, beginning in the middle, and passing the brush to one end; and then with another stroke from the middle, passing it to the other. But no part should be crossed or twice passed over, in forming one coat, where it can possibly be

avoided. When one coat is dry, another must be laid over it; and this must be continued at least five or six times, or more, if on trial there be not sufficient thickness of varnish to bear the polish, without laying bare the painting or the ground colour underneath.

When a sufficient number of coats is thus laid on, the work is fit to be polished; which must be done, in common cases, by rubbing it with a rag dipped in Tripoli or pumice-stone, commonly called *rotten stone*, finely powdered: but towards the end of the rubbing, a little oil of any kind should be used along with the powder; and when the work appears sufficiently bright and glossy, it should be well rubbed with the oil alone, to clean it from the powder, and give it a still brighter lustre.

In the case of white grounds, instead of the Tripoli or pumice-stone, fine putty or whiting must be used; both which should be washed over to prevent the danger of damaging the work from any sand or other gritty matter that may happen to be commixed with them.

It is a great improvement of all kinds of japan work, to harden the varnish by means of heat; which, in every degree that it can be applied short of what would burn or calcine the matter, tends to give it a more firm and strong texture. Where metals form the body, therefore, a very hot stove may be used, and the pieces of work may be continued in it a considerable time; especially if the heat be gradually increased: but where wood is in question, heat must be sparingly used, as it would otherwise warp or shrink the body, so-as to injure the general figure.

JAPYDIA, in ancient geography, a western district of Illyricum, anciently threefold; the first *Japydia* extending from the springs of the Timavus to Istria; the second, from the river Arsia to the river Tedanus; and the third, called *Inalpina*, situated in mount Albius and the other Alps, which run out above Istria. *Japodes*, or *Japydes*, the people. Now constituting the south part of Carniola, and the west of Austrian Croatia.

JAPYDIA, CALABRIA, anciently so called by the Greeks. *Japyges*, the people.

JAPYGIUM, in ancient geography, a promontory of Calabria; called also *Salentinum*. Now *Capo di S. Maria di Leuca*.

JAQUELOT (ISAAC), a celebrated French Protestant divine, born in 1647 at Vassy in Champagne, where his father was minister. The revocation of the edict of Nantz obliging him to quit France, he took refuge first at Heidelberg, and then at the Hague, where he procured an appointment in the Walloon church. Here he continued till that capital was taken by the king of Prussia, who, hearing him preach, made him his French minister in ordinary at Berlin; to which city he removed in 1702. While he lived at Berlin, he entered into a warm controversy with M. Bayle on the doctrine advanced in his dictionary favouring manichæism, which continued until death imposed silence on both parties: and it was in this dispute that M. Jaquelot openly declared in favour of the Remonstrants. He wrote, among other works, 1. *Dissertations sur l'existence de Dieu*. 2. *Dissertations sur le Messie*. 3. *Lettres à Messieurs les Prelats de l'Eglise Gallicane*. He was employed in finishing an important work upon the divine authority of the holy scriptures, when he died suddenly in 1708, aged 61.

JAR, an earthen pot or pitcher, with a big belly and two handles. The word comes from the Spanish *jarra*, or *jarro*, which signify the same.

JAR is used for a sort of measure or fixed quantity of fluid or solid goods. The *jar* of oil is from 18 to 26 gallons; the *jar* of green ginger is about 100 pounds weight.

JARCHI (SOLOMON), otherwise *Raschi* and *Isoaki Solomon*, a famous rabbi, born at Troyes in Champagne, who flourished

in the 12th century. He was a perfect master of the talmud and gemara; and he filled the postils of the bible with so many talmudical reveries, as totally extinguished both the literal and moral sense of it. A great part of his commentaries are printed in Hebrew, and some have been translated into Latin by the Christians. They are all greatly esteemed by the Jews, who have bestowed on the author the title of *prince of commentators*.

JARDYN, or JARDIN, (KAREL DU), painter of conversations, landscapes, &c. was born at Amsterdam in 1640, and became a disciple of Nicholas Berchem. He travelled to Italy whilst he was yet a young man; and arriving at Rome, he gave himself up alternately to study and dissipation. Yet, amidst this irregularity of conduct, his proficiency in the art was surprising; and his paintings rose into such high repute, that they were exceedingly coveted at Rome, and bought up at great prices. With an intention to visit his native city he at last left Rome; but passing through Lyons, and meeting some agreeable companions, they prevailed on him to stay there for some time, and he found as much employment in that city as he could possibly undertake or execute. But the profits which arose from his paintings were not proportionable to his profusion; and in order to extricate himself from the encumbrances in which his extravagance had involved him, he was induced to marry his hostess, who was old and disagreeable, but very rich. Mortified and ashamed of that adventure, he returned as expeditiously as possible to Amsterdam, accompanied by his wife, and there for some time followed his profession with full as much success as he had met with in Italy or Lyons. He returned to Rome the second time; and after a year or two spent there in his usual extravagant manner, he settled at Venice. In that city his merit was well known before his arrival, which procured him a very honourable reception. He lived there highly caressed, and continually employed; but died at the age of 38. He was sumptuously interred, out of respect to his talents; and, although a Protestant, permitted to be laid in consecrated ground. This painter, in his colouring and touch, resembled his master Berchem; but he added to that manner a force which distinguishes the great masters of Italy; and it is observed, that most of his pictures seem to express the warmth of the sun, and the light of mid-day. His pictures are not much encumbered; a few figures, some animals, and a little landscape for the backgrounds, generally comprise the whole of his composition. However, some of his subjects are often more extensive, containing more objects, and a larger design. His works are as much sought after, as they are difficult to be met with.

JARGEAU, an ancient town of France, in the department of Loiret and late provinces of Orleanois, taken by the English in 1438, and retaken by Joan of Arc the next year. It is 10 miles S. E. of Orleans, and 70 S. W. of Paris.

JARGON, a kind of precious stone, of the nature of the diamond, but softer; found in Brasil according to M. de Bomare; but in Ceylon, according to M. Romé de l'Isle. Its specific gravity is nearly equal to that of the ponderous spar, being 4.416. Its crystals consist of two tetrahedral pyramids of equal sides, separated by a short prism; so that the jargon is properly of a dodecahedral form. According to some lapidaries, the jargon comes nearest to the sapphire in hardness; and as they have when cut and polished a great resemblance to the diamond, they are called by some *soft diamonds*; and one may be easily imposed upon in purchasing these for the true kind, when they are made up in any sort of jewellery work. On exposing this stone to a violent fire, M. d'Arcot found the surface a little vitrified where it stuck to the porcelain test in which it was set; whence it appears, that the jargon has not the least resemblance to the diamond, which is destructible by fire. See DIAMOND.

JARIMUTH, JARMUTH, or *Jerimoth*, Josh. xv. a town

reckoned to the tribe of Judah, four miles from Eleutheropolis. westward, (Jerom.) Thought to be the same with Ramoth and Remeth, Joshua xix. and Nehem. x. 2. (Reland.)

JARNAC, a town of France, in the department of Charente and late province of Angoumois. It is remarkable for a victory obtained by Henry III. (then duke of Anjou) over the Huguenots, in 1569, when their general, Lewis I. prince of Condé, was killed. It is seated on the river Charente, 20 miles W. of Angoulême, and 235 S. by W. of Paris. W. lon. c. 4. N. lat. 45. 43.

JAROMITZ, a town of Bohemia, seated on the river Elbe, 27 miles S. W. of Glatz, and 52 N. E. of Prague. E. lon. 15. 57. N. lat. 50. 22.

JAROSLOW, a handsome town of Austrian Poland, in the palatinate of Red Russia, with a strong citadel. It is remarkable for its great fair, its handsome buildings, and a battle gained by the Swedes in 1656, after which they took the town. It is seated on the river Saine, 55 miles W. of Lemburg, and 100 E. of Cracow. E. lon. 22. 43. N. lat. 50. 4.

JARROW, a village in the bishopric of Durham, situated near Shields, on the Tyne; where, in 1763, a stone was dug up in the church, importing that the foundation of that building was begun in 674, in the reign of Egfrid, king of Northumberland, by Ceolfrid its abbot.

JASENITZ, a town of Germany, in Prussian Pomerania and in the duchy of Stetin. It is seated at the mouth of the Oder, eight miles below Stetin.

JASHER (THE BOOK OF). This is a book which Joshua mentions, and refers to in the following passage: "And the sun stood still, and the moon stayed, until the people had avenged themselves upon their enemies: is not this written in the book of Jasher?" It is difficult to determine what this *book of Jasher*, or "the upright," is. St. Jerom and the Jews believed it to be Genesis, or some other book of the Pentateuch, wherein God foretold he would do wonderful things in favour of his people. Huetius supposes it was a book of morality, in which it was said that God would subvert the course of nature in favour of those who put their trust in him. Others pretend, it was public annals, or records, which were styled *justice* or *upright*, because they contained a faithful account of the history of the Israelites. Grotius believes, that this book was nothing else but a song, made to celebrate this miracle and this victory. This seems the more probable opinion, because the words cited by Joshua as taken from this work, "Sun, stand thou still upon Gibeon, and thou moon in the valley of Ajalon," are such poetical expressions as do not suit with historical memoirs; besides that in the 2d book of Samuel (i. 18.) mention is made of a book under the same title, on account of a song made on the death of Saul and Jonathan.

JASIONE, in botany; a genus of the monogamia order, belonging to the syngenesia class of plants; and in the natural method ranking under the 29th order, *Campanaceæ*. The common calyx is ten-leaved; and the corolla has five regular petals; the capsule beneath, two-celled.

JASMINE. See JASMINUM.

Arabian JASMINE. See NYCTANTHES.

JASMINUM, JASMINE, or *Jessamine-tree*, in botany; a genus of the monogynia order, belonging to the diandria class of plants; and in the natural method ranking under the 44th order, *Sepiariæ*. The corolla is quinquefid, the berry dicoccus; the seeds arillated, the antheræ within the tube.

The species are, 1. The *officinalis*, or common white jasmine, with shrubby long slender stalks and branches, rising upon support 15 or 20 feet high, with numerous white flowers from the joints and ends, of a very fragrant odour. There is a variety with white-striped, and another with yellow-striped leaves. 2. The *fruticans*, or shrubby yellow jasmine, hath

shrubby, angular, trailing stalks and branches, rising upon support eight or ten feet high; trifoliate and simple alternate leaves; with yellow flowers from the sides and ends of the branches, appearing in June; frequently producing berries of a black colour. This species is remarkable for sending up many suckers from its roots; often so plentifully as to overspread the ground, if not taken up annually. 3. The *humilis*, or dwarf yellow jasmine, hath shrubby firm stalks, and angular branches, of low, somewhat robust and bushy growth; broad, trifoliate, and pinnated leaves; and large yellow flowers in July, sometimes succeeded by berries. 4. The *grandiflorum*, or great-flowered Catalonian jasmine, hath a shrubby firm upright stem, branching out into a spreading head from about three to six or eight feet high, with large flowers of a bluish red colour without, and white within, appearing from July to November. Of this there is a variety with semi-double flowers, having two series of petals. 5. The *azoricum*, or azorian white jasmine, hath shrubby, long slender stalks and branches, rising upon support 15 or 20 feet high, with pretty large flowers of a pure white colour; coming out in loose bunches from the ends of the branches, and appearing most part of the summer and autumn. 6. The *odoratissimum*, or most sweet-scented yellow Indian jasmine, hath a shrubby upright stalk branching erect, without support, six or eight feet high, with bright yellow flowers in bunches from the ends of the branches; flowering from July till October, and emitting a most fragrant odour.

The three first species are sufficiently hardy to thrive in this climate without any shelter. They may be easily propagated by layers and cuttings; and the striped varieties by grafting or budding on stocks of the common kind. The other three species, which are tender, may also be increased by layers, or seeds, or by grafting and budding them upon the common white and shrubby yellow jasmine. They require shelter in a green-house in winter, and therefore must always be kept in pots to move them out and in occasionally. The pots must be filled with light, rich earth, frequently watered in summer, and about once a week in winter, but always moderately during that season. Prune off all the decayed wood at any time when it appears, and shorten or retrench the rambling shoots as you see occasion, to preserve the heads somewhat regular; managing them in other respects as the common green house plants.

JASON, the Greek hero who undertook the Argonautic expedition, the history of which is obscured by fabulous traditions, flourished about 937 B. C.

JASPACHATES. See JADE-STONE.

JASPER, in natural history, a genus of stones belonging to the siliceous class. According to Cronstedt, all the opaque flints are called by this name whose texture resembles dry clay, and which cannot be any other way distinguished from flints, except that they are more easily melted; which perhaps may also proceed from a mixture of iron. The species are,

1. *Pure jasper*; which, Cronstedt informs us, cannot be decomposed by any means hitherto known; though Mr. Kirwan says that it contains 75 *per cent.* of silex; 20 of argil, and about five of calx of iron. The specific gravity is from 2680 to 2778. It is found of different colours; viz. green with red dots from Egypt, called also the *heliotrope*, or *blood-stone*; quite green from Bohemia; red from Italy, called there *diaspro rosso*, or yellow, called *melites* by the ancients; a name, according to Pliny, of the same import with *male coloris*. It is also found red with yellow spots and veins in Sicily, Spain, and near Constantinople, called by the Italians *diaspro florido*; or black from some places in Sweden, called by the Italians *paragone antico*.

2. *Jaspis martialis*, or sinople, containing iron. This is a dark red stone containing 18 or 20 *per cent.* of metal. Near Chemnitz, where it forms very considerable veins, as Brunnich

informs us, it has frequently specks of marcasite, cubic lead ores, and blend. It has likewise so much gold as to be worth working: there is likewise a striped sinople of various colours. There are several varieties differing in the coarseness and fineness of their texture, as well as the shade of their colour; varying from a deep brown to a yellow. The last is attracted by the magnet after calcination.

Cronstedt observes that jasper, when fresh broken, so nearly resembles a bole of the same colour, that it can only be distinguished by its hardness. In the province of Dalarne in Sweden, it is found in a kind of hard sand stone; in other places it is found within such unctuous clefts as are usually met with in Cornish clay, red chalk, and other substances of that kind. There are likewise some jaspers that imbibe water; from whence, and other considerations, our author is of opinion that they have clay for their basis, notwithstanding their hardness. According to Magellan, it resists the blow-pipe *per se*, and is only partially soluble with the mineral alkali; separating into small particles with effervescence: with borax or microcosmic salt it melts without any effervescence. Bergman, in his *Sciagraphia*, informs us, that it is composed of siliceous earth united to a clay very full of iron. The mineral acids have no effect upon it in a short time, but corrode it by some months immersion. On treating a small piece of green jasper with vitriolic acid, some crystals of alum and green vitriol were obtained; which shows that iron and clay are ingredients in its composition. M. Daubenton mentions 15 varieties of this substance. 1. Green, from Bohemia, Silesia, Siberia, and the shores of the Caspian sea; which seems to be the *pavonium* of Aldrovandus. 2. The diaspro rosso, or red jasper; less common, and in smaller masses, than the green. 3. Yellow from Freyberg and Roetzlitz; sometimes of a citron colour, and appearing as if composed of silky filaments; commonly called the *silk jasper*. 4. Brown from Dalecarlia in Finland and Sweden. 5. The violet from Siberia. 6. The black from Sweden, Saxony, and Finland. 7. The blueish-grey, a very rare species. 8. The milky white mentioned by Pliny, and found in Dalecarlia. 9. The variegated with green, red, and yellow clouds. 10. The blood stone, green with red specks, from Egypt, which was supposed to stop the blood. 11. The veined with various colours. Sometimes these veins have a distant resemblance to various letters, and then the jasper is named by the French *jaspé grammatique*. Some of these, found near Rochelle in France, on account of their curious variety in this respect are named *polygrammatiques*. 12. The jasper with various coloured zones. 13. That called *florido* by the Italians; which has various colours mixed promiscuously without any order. 14. When the jasper has many colours together, it is then (very improperly) called *universal*. 15. When it contains some particles of agate, it is then called *agatized jasper*.

JASPONYX, in natural history, the purest horn-coloured onyx, with beautiful green zones, which are composed of the genuine matter of the finest jaspers. See the articles JASPER and ONYX.

JASQUE, a seaport of Persia, on the gulf of Ormus, and in the province of Tuberan. E. lon. 59. 15. N. lat. 26. 10.

JASSELMERE, a town of Hindoostan Proper, in a small territory of the same name, subject to a petty rajah, in the province of Aginere. It is 680 miles N. of Bombay. E. lon. 73. 0. N. lat. 27. 34.

JASSY, a considerable city of Europe, the capital of Moldavia, and residence of the hospodar of that country, who is a vassal of the grand signior. In 1753 the whole city, with the palace of the hospodar, some papish convents, and a new Lutheran church, was destroyed by fire. It is seated on the river Pruth, and is a well-fortified place, defended by a castle. However, it has been several times taken in the wars between the Turks and

the Russians or Austrians; the last time by the latter in 1788, who restored it by the peace of Reichenbach in 1790. E. lon. 27. 35. N. lat. 47. 8.

JATROPHA, the CASSADA PLANT; a genus of the monadelphia order, belonging to the monœcia class of plants; and in the natural method ranking under the 38th order, *Tricocca*. There is no male calyx; the corolla is monopetalous, and funnel-shaped; there are ten stamina, one alternately longer than the other. There is no female calyx; the corolla is pentapetalous, and patent; there are three bifid styles; the capsule is trilocular, with one seed in each cell.

There are nine species, of which the most remarkable are, 1. The *curcas*, or English physic-nut, with leaves cordate and angular, is a knotty shrub growing about 10 or 12 feet high. The extremities of the branches are covered with leaves; and the flowers, which are of a green herbaceous kind, are set on in an umbel fashion round the extremities of the branches, but especially the main stalks. These are succeeded by as many nuts, whose outward tegument is green and husky, which being peeled off discovers the nut, whose shell is black, and easily cracked: this contains an almond-like kernel, divided into two parts, between which separation lie two milkwhite thin membranaceous leaves, easily separable from each other. These have not only a bare resemblance of perfect leaves, but have, in particular, every part, the stalk, the middle rib, and transverse ones, as visible as any leaf whatsoever. 2. The *gossypifolia*, cotton-leaved jatropha or belly-ach bush, the leaves of which are quinquepartite, with lobes ovate and entire, and glandular branchy bristles. The stem, which is covered with a light greyish bark, grows to about three or four feet high, soon dividing into several wide extended branches. These are neither decorated with leaves nor flowers till near the top, which is then surrounded by the former: their foot-stalks, as well as the young buds on the extremity of the branches, are guarded round with stiff hairy bristles, which are always tipped with glutinous liquid drops. From among these rise several small deep red pentapetalous flowers, the pistil of each being thick-set at the top with yellow farinaceous dust which blows off when ripe: these flowers are succeeded by hexagonal husky blackish berries, which when ripe open by the heat of the sun, emitting a great many small dark-coloured-seeds, which serve as food for ground doves. The leaves are few; but seldom or never drop off, nor are eaten by vermin of any kind. 3. The *multifida*, or French physic-nut, with leaves many-parted and polished, and stipules bristly and multifid, grows to be ten feet high. The main stalk divides into very few branches, and is covered with a greyish white bark. The leaves stand upon six-inch foot-stalks, surrounding the main stalk, generally near the top in an irregular order. The flowers grow in bunches, umbel fashion, upon the extremities of each large stalk, very much resembling, at their first appearance, a bunch of red coral: these afterwards open into small five leaved purple flowers, and are succeeded by nuts, which resemble those of the first species. 4. The *manibet*, or bitter cassada, has palmated leaves; the lobes lanceolate, very entire, and polished. 5. The *janipha*, or sweet cassada, has palmated leaves, with lobes very entire; the intermediate leaves lobed with a sinus on both sides. 6. The *classica*, with ternate leaves, elliptic, very entire, hoary underneath, and longly petioled. See figures of the two last in plate 22. which renders a more particular description unnecessary.

The first species, a native of the West Indies, is planted round negro gardens. A decoction of the leaves of it, and of the second species (which grows wild), Dr. Wright informs us, is often used with advantage in spasmodic belly-ach attended with vomiting: it sits easier on the stomach than any thing else, and seldom fails to bring about a discharge by stool. The third species, a native of the same countries, is cultivated there as an

ornamental shrub. The seeds of all the three are drastic purgatives and emetics; and they yield, by decoction, an oil of the same uses and virtues as the oleum ricini. See RICINUS. The 4th and 5th species, the *janipha* and *manihot*, are natives of Africa and the West Indies, where they are cultivated as articles of food. It is difficult, Dr. Wright says, to distinguish the bitter from the sweet cassada by the roots: but it will be best to avoid those of the cassada that bears flowers, as it is the bitter, which is poisonous when raw.

The root of bitter cassada has no fibrous or woody filaments in the heart, and neither boils nor roasts soft. The sweet cassada has all the opposite qualities. The bitter, however, may be deprived of its noxious qualities (which reside in the juice) by heat. Cassada bread, therefore, is made of both the bitter and sweet, thus:—The roots are washed and scraped clean; then grated into a tub or trough: after this they are put into a hair bag, and strongly pressed with a view to squeeze out the juice, and the meal or farina is dried in a hot stone basin over the fire: it is then made into cakes. It also makes excellent puddings, equal to millet.—The scrapings of fresh bitter cassada are successfully applied to ill disposed ulcers.—Cassada roots yield a great quantity of starch, which the Brazilians export in little lumps under the name of *tapioca*. According to Father Labat, the small bits of manioc which have escaped the grater, and the clods which have not passed the sieve, are not useless. They are dried in the stove after the flour is roasted, and then pounded in a mortar to a fine white powder, with which they make soup. It is likewise used for making a kind of thick coarse cassada, which is roasted till almost burnt; of this, fermented with molasses and West-India potatoes, they prepare a much esteemed drink or beverage called *ouycou*. This liquor, the favourite drink of the natives, is sometimes made extremely strong, especially on any great occasion, as a feast: with this they get intoxicated, and, remembering their old quarrels, massacre and murder each other. Such of the inhabitants and workmen as have not wine, drink ouycou. It is of a red colour, strong, nourishing, refreshing, and easily inebriates the inhabitants, who soon accustom themselves to it as easily as beer.

The 6th species is the *Hevea Guianensis* of Aublet, (*Histoire des Plantes de la Guiane Française*, p. 87.) or tree which yields the elastic resin called *caoutchouc* or *India rubber*; for a particular account of which, see the article CAOUTCHOUC. The figure we have given is copied from Aublet's tab. 335, and not from the erroneous plate given in the *Acta Parisiana*.

JATS, THE, once a powerful Hindoo tribe, in Hindoostan Proper, to whom all that now remains is the small territory of Bhartpour, 45 miles W. of Agra.

JAVA, a large island of the East Indies. See BATAVIA.

JAVELIN, in antiquity, a sort of spear five feet and an half long; the shaft of which, was of wood, with a steel point. Every soldier in the Roman armies had seven of these, which were very light and slender.

JAVELLO (CHRYSTOSTOME), a learned Italian Dominican of the 16th century, taught philosophy and theology at Bologna, and died about the year 1540. He wrote a work on philosophy, another on politics, and another on Christian œconomy, which are esteemed; with notes on Pomponatius, and other works, printed in 3 vols. folio.

JAWER, a city of Silesia, capital of a province of the same name, with a citadel, and a large square surrounded with piazzas. It is 12 miles south-east of Lignitz, 30 south-west of Breslau, and 87 east of Prague. E. lon. 16. 29. N. lat. 50. 56.

JAUNDICE, from the French *jaunisse* "yellowness," of *jaune* "yellow;" a disease consisting in a suffusion of the bile over the whole surface of the body. See MEDICINE.

JAWS. See MAXILLÆ.

Locked JAW, is a spasmodic contraction of the lower jaw,

commonly produced by some external injury affecting the tendons or ligaments. See MEDICINE.

JAY, in ornithology. See CORVUS.

JAY (Guy Michael le), a French gentleman, who distinguished himself by causing a polyglott bible to be printed at his own expence in 10 vols. folio: but he ruined himself by that impression, first because he would not suffer it to appear under the name of cardinal Richelieu, who, after the example of cardinal Ximenes, was ambitious of eternizing his name by this means; and next, because he made it too dear for the English market; on which Dr. Walton undertook his polyglott bible, which, being more commodious, reduced the price of M. le Jay's. After the death of his wife, M. le Jay took orders, was made dean of Vezelay in the Nivernois, and Louis XIV. gave him the post of counsellor of state.

JAZER, or JASER, in ancient geography, a Levitical city in the territory of the Amorrites beyond Jordan, 10 miles to the west, or rather south-west, of Philadelphia, and 15 miles from Esbon; and therefore situated between Philadelphia and Heshbon, on the east border of the tribe of Gad, supposed to be the *Jazorem* of Josephus. In Jeremiah xlviii. mention is made of the sea of Jazer, that is a lake; taken either for an effusion or overflowing of the Arnon, or a lake through which it passes, or from which it takes its rise.

IBERIA (SPAIN), so called by the ancients from the river Iberus. *Iberes* the people, from the nominative *Iber*. Iberia was also the name of an inland country of Asia, having Colchis to the west, with a part of Pontus; to the north mount Caucasus; on the east Albania; and on the south Armenia Magna: Now the western part of Georgia. Iberia, according to Josephus, was first peopled by Tubal, the brother of Gomer and Magog. His opinion is confirmed by the Septuagint; for Meshech and Tubal are by these interpreters rendered *Moschi* and *Iberians*. We know little of the history of the country till the reign of Mithridates, when their king, named *Artocis*, siding with that prince against Lucullus, and afterwards against Pompey, was defeated by the latter with great slaughter; but afterwards obtained a peace, upon delivering up his sons as hostages. Little notice is taken of the succeeding kings by the ancient historians. They were probably tributary to the Romans till that empire was overturned, when this, with the other countries in Asia bordering on it, fell successively under the power of the Saracens and Turks.

IBERIS, SCIATICA CRESSES, or *Candy-tuft*; a genus of the filiquosa order, belonging to the tetradynamia class of plants; and in the natural method ranking under the 39th order, *Siliquosæ*. The corolla is irregular; the two exterior petals larger than the interior ones; the silicula polyspermous, emarginated. The species are, 1. The *umbellata*, or common candy-tuft, hath herbaceous, short, round, and very branchy stalks of tufty growth, from about six to eight or ten inches high; small spear-shaped leaves, the lower ones ferrated, the upper entire; and all the stalks and branches terminated by umbellate clusters of flowers of different colours in the varieties. 2. The *amara*, or bitter candy-tuft, hath stalks branching like the former, which rise from eight to ten or twelve inches high; small, spear-shaped, and slightly indented leaves; and all the branches terminated by racemose bunches of white flowers in June and July. 3. The *sempervirens*, commonly called *tree candy-tuft*, hath low undershrubby stalks, very branchy and bushy, rising to the height of 10 or 12 inches, with white flowers in umbels at the ends of the branches, appearing great part of the summer. 4. The *semper-florens*, or ever-flowering shrubby iberis, hath low undershrubby stalks very branchy, growing to the height of 18 inches, with white flowers in umbels at the ends of the branches, appearing at all times of the year. The two first kinds, being hardy annuals, may be sowed in any common soil in the month of March,

or from that time till midsummer, and will thus afford a succession of flowers from June to September, which are succeeded by great plenty of seeds. The other two are somewhat tender; and therefore must be planted in pots, in order to be sheltered from the winter-frosts. They are easily propagated by slips or cuttings.

IBEX, in zoology. See CAPRA.

IBIS, in ornithology. See TANTALUS.

IBORG, or IBERG, a town of Germany, in the circle of Westphalia, and bishopric of Osnaburgh, 10 miles S. W. of Osnaburgh, and 30 N. E. of Munster. E. lon. 8. 20. N. lat. 52. 14.

IBYCUS, a Greek lyric poet, of whose works there are only a few fragments remaining, flourished 550 B. C. It is said that he was assassinated by robbers; and that, when dying, he called upon some cranes he saw flying to bear witness. Some time after, one of the murderers seeing some cranes, said to his companions, "There are the witnesses of Ibycus's death:" which being reported to the magistrates, the assassins were put to the torture, and, having confessed the fact, were hanged. Thence arose the proverb *Ibyci Crues*.

ICE, a brittle transparent body, formed of some fluid frozen or fixed by cold. See the articles FREEZING and FROST. The specific gravity of ice to water is various, according to the nature and circumstances of the water, degree of cold, &c. Dr. Living (Phipps's Voyage towards the North Pole) found the densest ice he could meet with about a 14th part lighter than water. M. de Mairan found it, at different trials, 1-14th, 18th, or 19th, lighter than water; and when the water was previously purged of air, only a 22d part.

The refraction of ice has been supposed owing to the air-bubbles produced in it while freezing: these, being considerably large in proportion to the water frozen, render the ice so much specifically lighter. It is well known that a considerable quantity of air is lodged in the interstices of water, though it has there little or no elastic property, on account of the disunion of its particles; but upon these particles coming closer together, and uniting as the water freezes, light, expansive, and elastic air-bubbles are thus generated, and increase in bulk as the cold grows stronger, and by their elastic force burst to pieces any vessel in which the water is closely contained. But snow-water, or any water long boiled over the fire, affords an ice more solid, and with fewer bubbles. Pure water long kept in vacuo and frozen afterwards there, freezes much sooner, on being exposed to the same degree of cold, than water unpurged of its air and set in the open atmosphere. And the ice made of water thus divested of its air is much harder, more solid and transparent, and heavier than common ice.

But M. de Mairan, in a dissertation on Ice, attributes the increase of the bulk of the water under this form, chiefly to a different arrangement of its parts: the icy skin on water being composed of filaments which are found to be joined constantly and regularly at an angle of 60°, and which, by this disposition, occupy a greater volume than if they were parallel. Besides, after ice is formed, he found it continue to expand by cold; a piece of ice, which was at first only a 14th part specifically lighter than water, on being exposed some days to the frost, became a 12th part lighter; and thus he accounts for the burbling of ice in ponds.

It appears from an experiment of Dr. Hooke, in 1663, that ice refracts the light less than water; whence he infers, that the lightness of ice, which causes it to swim in water, is not produced merely by the small bubbles which are visible in it, but that it arises from the uniform constitution or general texture of the whole mass: a fact which was afterward approved by M. de la Hire. See Hooke's Exper. by Derham, p. 26, Acad. Par. 1693, Mem. p. 25.

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But a discovery the most curious and important of any of modern times, relative to the formation of ice, is that described by Count Rumford in his Essay "On the Manner in which Heat is propagated in Fluids."

After proving in a very satisfactory way, that the particles of fluids are incapable of imparting heat to each other, and that, when their temperature is undergoing any change, an intestine motion is kept up in them, by a successive alteration taking place in the specific gravity of their particles, he proceeds to show, that "all bodies are condensed by cold without limitation, *water only excepted*," and describes the wonderful effects produced in consequence of this particular law.

"Though in temperatures above blood-heat (says Count Rumford), the expansion of water with heat is very considerable, yet in the neighbourhood of the freezing point it is almost nothing. And what is still more remarkable, as it is an exception to one of the most general laws of Nature with which we are acquainted, when in cooling it comes within eight or nine degrees of Fahrenheit's scale of the freezing point, instead of going on to be farther condensed as it loses more of its heat, it *actually expands* as it grows colder, and continues to expand more and more as it is more cooled."

"If the whole amount of the condensation of any given quantity of boiling hot water, on being cooled to the point of freezing, be divided into any given number of equal parts, the condensations corresponding to equal changes of temperature will be very unequal in different temperatures."

"In cooling 22½ degrees of Fahrenheit's scale, (or one eighth part of the interval between the boiling and the freezing points), the condensation will be,

Condensation.

"In cooling 22½° viz. from 212°	to 189½°	- 18 parts.
189½	— 167	- 16.2
167	— 144½	- 13.8
144½	— 122	- 11.5
122	— 99½	- 9.3
99½	— 77	- 7.1
77	— 54½	- 3.9
54½	— 32	- 0.2

"Hence it appears that the condensation of water, or increase of its specific gravity in being cooled 22½ degrees of Fahrenheit's scale, is at least *ninety times greater* when the water is boiling-hot, than when it is at the mean temperature of the atmosphere in England (54½°), or within 22½ degrees of freezing—(for 18 is to 0.2 as 90 to 1).

"All liquids, it is true, in cooling, are more condensed by any given change of temperature when they are very hot, than when they are colder; but these differences are nothing compared to those we observe in water."

"The ratio of the condensation in cooling from 212° to 189½° to that in cooling from 54½° to 32° in each of the under-mentioned fluids, has been shown, by the Experiments of M. DE LUC, to be as follows:

Olive oil	-	as 1.14 to 1
Strong spirits of wine	-	as 1.25 to 1
A saturated solution of sea-salt in water	-	as 1.10 to 1

"The difference between the laws of the condensation of pure water, and of the same fluid when it holds in solution a portion of salt, is striking; but when we trace the effects which are produced in the world by that arrangement, we shall be lost in wonder and admiration."

After enlarging on this subject, he proceeds thus—"As nourishment and life are conveyed to all living creatures through the medium of water;—*liquid*,—*living* water;—to preserve life, it was absolutely necessary to preserve a great quantity of water in a fluid state, in winter as well as in summer."

"But in cold climates the temperature of the atmosphere, during many months in the year, is so much below the freezing point, that, had not measures been taken to prevent so fatal an accident, all the water must inevitably have been changed to ice, which would infallibly have caused the destruction of every living thing.

"Extraordinary measures were therefore necessary for preserving in a liquid state as much of the water existing in those climates as is indispensably necessary for the preservation of vegetable and animal life; and this could only be done by contriving matters so as to prevent this water from parting with its heat to the cold atmosphere.

"It has been shown,—I believe I may venture to say proved,—in the most satisfactory manner,—that liquids part with their heat ONLY in consequence of their internal motions;—and that the more rapid these motions are, the more rapid is the communication of the heat;—that these motions are produced by the change in the specific gravity of the liquid, occasioned by the change of temperature,—and of course that they are more rapid, as the specific gravity of the liquid is the more changed by any given change of temperature.

"But it has been shown that the change in the specific gravity of water is extremely small, which takes place in any given change of temperature, *below the mean temperature of the atmosphere*; and particularly when the temperature of the water is very near the freezing point; and hence it follows, that water must give off its heat very slowly when it is near freezing.

"But this is not all. There is a still more extraordinary, and in its consequences more wonderful, circumstance which remains to be noticed. When water is cooled to within eight or nine degrees of the freezing point, it not only ceases to be farther condensed, but is actually expanded by farther diminutions of its heat; and this expansion goes on as the heat is diminished, as long as the water can be kept fluid; and when it is changed to ice, it expands even still more, and the ice floats on the surface of the uncongealed part of the fluid."

Count Rumford next shews how very powerfully this wonderful contrivance tends to retard the cooling of water when it is exposed in a cold atmosphere.

"It is well known that there is no communication of heat between two bodies as long as they are both at the same temperature; and it is likewise known that the *tendency* of heat to pass from a hot body into one which is colder, with which it is in contact, is greater, as the difference is greater in the temperatures of the two bodies.

"Suppose now that a mass of very cold air repotes on the quiet surface of a large lake of fresh water, at the temperature of 55° of Fahrenheit's thermometer. The particles of water at the surface, on giving off a part of their heat to the cold air with which they are in contact, and in consequence of this loss of heat becoming specifically heavier than those hotter particles on which they repose, must of course descend. This descent of the particles which have been cooled necessarily forces other hotter particles to the surface, and these being cooled in their turns bend their course downwards; and the whole mass of water is put into motion, and continues in motion as long as the process of cooling goes on.

"As soon as the water in cooling has arrived at the temperature of about 40°, as at that temperature it ceases to be farther condensed, its internal motion ceases, and those of its particles which happen to be at its surface remain there; and after being cooled down to the freezing point, they give off their latent heat, and ice begins to be formed.

"As soon as the surface of the water is covered with ice, the communication of heat from the water to the atmosphere is rendered extremely slow and difficult; for ice being a *bad conductor of heat* forms a very warm covering to the water,—and

moreover it prevents the water from being agitated by the wind. Farther, as the temperature of the ice at its lower surface is always very nearly the same as that of the particles of liquid water with which it is in contact, (the warmer particles of this fluid, in consequence of their greater specific gravity, taking their places below,) the communication of heat between the water and the ice is necessarily very slow on that account.

"As soon as the upper surface of the ice is covered with snow, (which commonly happens soon after the ice is formed,) this is an additional and very powerful obstacle to prevent the escape of the heat out of the water; and though the most intense cold may reign in the atmosphere, the increase of the thickness of the ice will be very slow."

This subject is continued by Count Rumford in p. 293 of his Essay; but as the enquiry takes a direction not agreeable to the purport of this article, we must refer to the article *PROPAGATION of Heat*, where we purpose to give some account of the origin of this curious discovery.

Sir Robert Barker thus describes the process of making ice in the East Indies, in a country where he never saw any natural ice. On a large plain they dig three or four pits, each about 30 feet square, and 2 feet deep; the bottoms of which are covered, about 8 or 12 inches thick, with sugar-cane, or the stems of the large Indian corn, dried. On this bed are placed in rows a number of small shallow unglazed earthen pans, formed of a very porous earth, a quarter of an inch thick, and about an inch and a quarter deep; which, at the dusk of the evening, they fill with soft water that has been boiled. In the morning before sunrise the ice-makers attend at the pits, and collect what has been frozen in baskets, which they convey to the place of preservation. This is usually prepared in some high and dry situation, by sinking a pit 14 or 15 feet deep, which they line first with straw, and then with a coarse kind of blanketing. The ice is deposited in this pit, and beaten down with rammers, till at length its own accumulated cold again freezes it, and it forms one solid mass. The mouth of the pit is well secured from the exterior air with straw and blankets, and a thatched roof is thrown over the whole. *Philos. Transf. vol. 65, p. 252.*

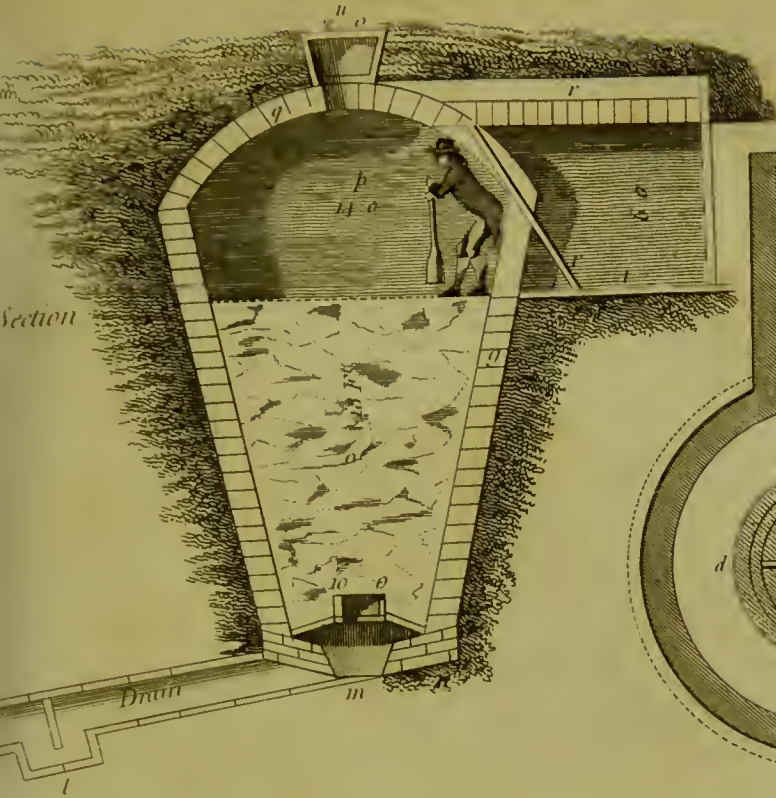
Blink of the Ice, is a name given by the pilots to a bright appearance near the horizon, occasioned by the ice, and observed before the ice itself is seen. See *ICE ISLAND*.

Ice Boats, boats so constructed as to sail upon ice, and which are very common in Holland, particularly upon the river Maese and the lake Y. See plate 23. They go with incredible swiftness, sometimes so quick as to affect the breath, and are found very useful in conveying goods and passengers over lakes and great rivers in that country. Boats of different sizes are placed in a transverse form upon a 2½ or 3 inch deal board: at the extremity of each end are fixed irons, which turn up in the form of skais: upon this plank the boat rests, and the two ends seem as out-riggers, to prevent oversetting; whence ropes are fastened that lead to the head of the mast in the nature of shrouds, and others passed through a block across the bowsprit: the rudder is made somewhat like a hatchet with the head placed downward, which being pressed down, cuts the ice, and serves all the purposes of a rudder in the water, by enabling the helmsman to steer, tack, &c.

Ice-Cream, a well known luxury, used in hot climates to cool the palate. It may be made after the following receipt: Take a sufficient quantity of cream, and when it is to be mixed with raspberry, or currant, or pine, a quarter part as much of the juice or jam as of the cream: after beating and straining the mixture through a cloth, put it with a little juice of lemon into the mould, which is a pewter vessel, and varying in size and shape at pleasure: cover the mould, and place it in a pail about two thirds full of ice, into which two handfuls of salt have been thrown: turn the mould by the hand-hold

I C E.

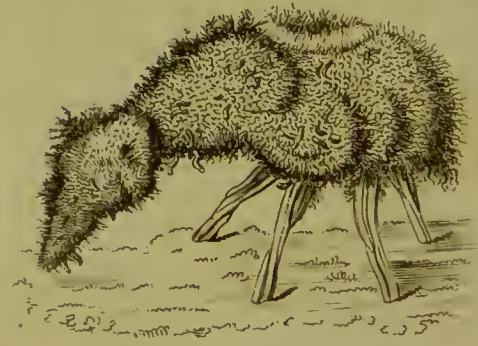
Ice-house.



Ice-boat.



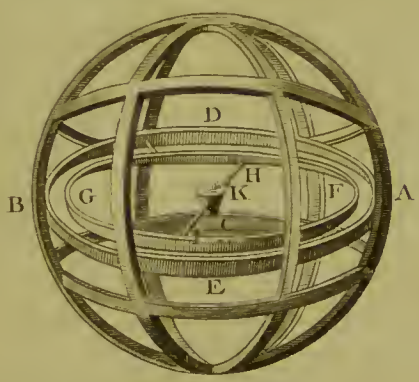
Scythian Lamb.



Lampyrus.



Rolling Lamp.



Jynx or Wry-neck.



ICHTHYOLOGY.

Fig. 2.

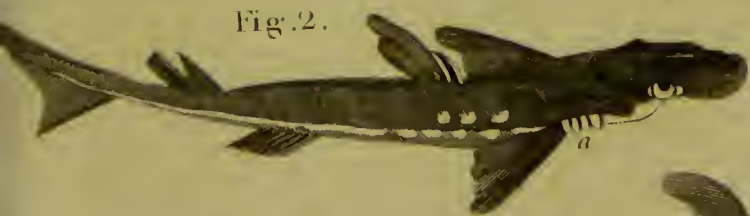


Fig. 1.

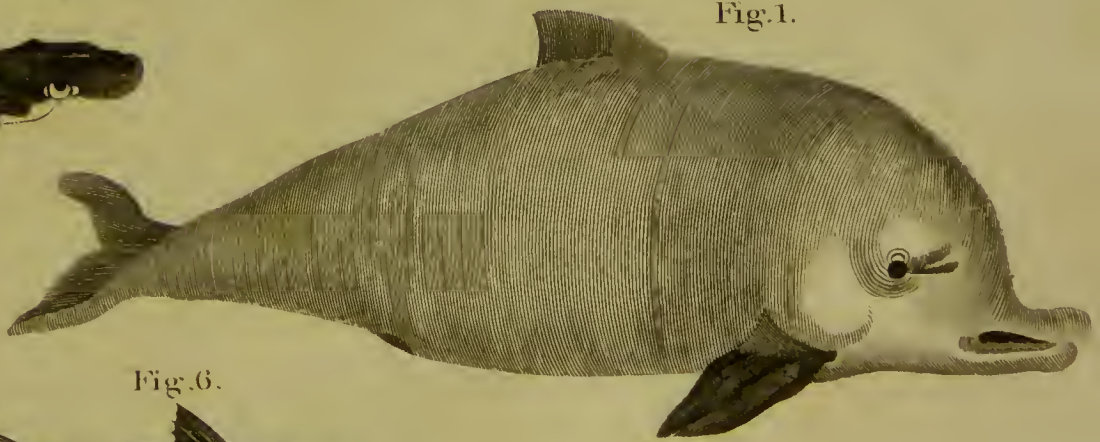


Fig. 5.



Fig. 6.

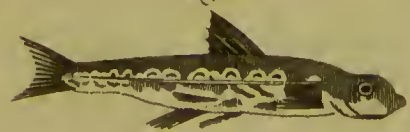


Fig. 4.



Fig. 3.



with a quick motion to and fro, in the manner used for milling chocolate, for eight or ten minutes; then let it rest as long, and turn it again for the same time; and having left it to stand half an hour, it is fit to be turned out of the mould, and to be sent to table. Lemon-juice and sugar, and the juices of various kinds of fruits, are frozen without cream; and when cream is used, it should be well mixed.

Ice-Hills, a sort of structure or contrivance common upon the river Neva at Petersburg, and which afford a perpetual fund of amusement to the populace. They are constructed in the following manner: A scaffolding is raised upon the river about 30 feet in height, with a landing-place on the top, the ascent to which is by a ladder. From this summit a sloping plain of boards, about four yards broad and 30 long, descends to the superficies of the river: it is supported by strong poles gradually decreasing in height, and its sides are defended by a parapet of planks. Upon these boards are laid square masses of ice, about four inches thick, which being first smoothed with the axe, and laid close to each other, are then sprinkled with water: by these means they coalesce, and, adhering to the boards, immediately form an inclined plain of pure ice. From the bottom of this plain the snow is cleared away for the length of 200 yards and the breadth of four, upon the level bed of the river; and the sides of this course, as well as the sides and top of the scaffolding, are ornamented with firs and pines. Each person, being provided with a sledge, mounts the ladder; and having attained the summit, he seats himself upon his sledge at the upper extremity of the inclined plain, down which he suffers it to glide with considerable rapidity, poising it as he goes down; when the velocity acquired by the descent carries it above 100 yards upon the level ice of the river. At the end of this course, there is usually a similar ice-hill, nearly parallel to the former, which begins where the other ends; so that the person immediately mounts again, and in the same manner glides down the other inclined plain of ice. This diversion he repeats as often as he pleases. The boys also are continually employed in skating down these hills: they glide chiefly upon one skait, as they are able to poise themselves better upon one leg than upon two. These ice-hills exhibit a pleasing appearance upon the river, as well from the trees with which they are ornamented, as from the moving objects which at particular times of the day are descending without intermission.

Ice-House, a repository for ice during the summer months. The aspect of ice-houses should be towards the east or south-east, for the advantage of the morning sun to expel the damp air, as that is more pernicious than warmth; for which reason trees in the vicinity of an ice-house tend to its disadvantage. The best soil for an ice-house to be made in is chalk, as it conveys away the waste water without any artificial drain; next to that, loose stony earth or gravelly soil. Its situation should be on the side of a hill, for the advantage of entering the cell upon a level, as represented in plate 23.

To construct an ice-house, first choose a proper place at a convenient distance from the dwelling-house or houses it is to serve: dig a cavity (if for one family, of the dimensions specified in the design) of the figure of an inverted cone, sinking the bottom concave, to form a reservoir for the waste water till it can drain off; if the soil requires it, cut a drain to a considerable distance, or so far as will come out at the side of the hill, or into a well, to make it communicate with the springs; and in that drain form a sink or air trap, marked *l*, by sinking the drain so much lower in that place as it is high, and bring a partition from the top an inch or more into the water, which will consequently be in the trap; and will keep the well airtight. Work up a sufficient number of brick piers to receive

a cart-wheel, to be laid with its convex side upwards to receive the ice; lay hurdles and straw upon the wheel, which will let the melted ice drain through, and serve as a floor. The sides and dome of the cone are to be nine inches thick—the sides to be done in steened brickwork, *i. e.* without mortar, and wrought at right angles to the face of the work: the filling in behind should be with gravel, loose stones or brick-bats, that the water which drains through the sides may the more easily escape into the well. The doors of the ice-house should be made as close as possible, and bundles of straw placed always before the inner door to keep out the air.

The following is a description of the parts referred to in the plate:—*a* The line first dug out. *b* The brick circumference of the cell. *c* The diminution of the cell downwards. *d* The lesser diameter of the cell. *e* The cart wheel; or joists and hurdles. *f* The piers to receive the wheel or floor. *g* The principal receptacle for straw. *h* The inner passage, *i* the first entrance, *k* the outer door, passages having a separate door each. *l* An air-trap. *m* The well. *n* The profile of the piers. *o* The ice filled in. *p* The height of the cone. *q* The dome worked in two half brick arches. *r* The arched passage. *s* The doorways inserted in the walls. *t* The floor of the passage. *u* An aperture through which the ice may be put into the cell; this must be covered next the crown of the dome, and then filled in with earth. *x* The sloping door, against which the straw should be laid.

The ice when to be put in should be collected during the frost, broken into small pieces, and rammed down hard in strata of not more than a foot, in order to make it one complete body; the care in putting it in, and well ramming it, tends much to its preservation. In a season when ice is not to be had in sufficient quantities snow may be substituted.

Ice may be preserved in a dry place under ground, by covering it well with chaff, straw, or reeds. Great use is made of chaff in some parts of Italy to preserve ice: the ice-house for this purpose need only be a deep hole dug in the ground on the side of a hill, from the bottom of which they can easily carry out a drain, to let out the water which is separated at any time from the ice, that it may not melt and spoil the rest. If the ground is tolerably dry, they do not line the sides with any thing, but leave them naked, and only make a covering of thatch over the top of the hole: this pit they fill either with pure snow, or else with ice taken from the purest and clearest water; because they do not use it as we do in England, to set the bottles in, but really mix it with the wine. They first cover the bottom of the hole with chaff, and then lay in the ice, not letting it any where touch the sides, but ramming in a large bed of chaff all the way between: they thus carry on the filling to the top, and then cover the surface with chaff; and in this manner it will keep as long as they please. When they take any of it out for use, they wrap the lump up in chaff, and it may then be carried to any distant place without waste or running.

Ice Island, a name given by sailors to a great quantity of ice collected into one huge solid mass, and floating about upon the seas near or within the Polar circles. Many of these fluctuating islands are met with on the coasts of Spitsbergen, to the great danger of the shipping employed in the Greenland fishery. In the midst of those tremendous masses navigators have been arrested and frozen to death. In this manner the brave Sir Hugh Willoughby perished with all his crew in 1553; and in the year 1773, Lord Mulgrave, after every effort which the most finished seaman could make to accomplish the end of his voyage, was caught in the ice, and was near experiencing the same unhappy fate. See the account at large in *Phipps's Voyage to the North Pole*. As there described, the scene, divested

of the horror from the eventful expectation of change, was the most beautiful and picturesque :—Two large ships becalmed in a vast basin, surrounded on all sides by islands of various forms : the weather clear ; the sun gilding the circumambient ice, which was low, smooth, and even ; covered with snow, excepting where the pools of water on part of the surface appeared crystalline with the young ice : the small space of sea they were confined in, perfectly smooth. After fruitless attempts to force a way through the fields of ice, their limits were perpetually contracted by its closing ; till at length it beset each vessel till they became immoveably fixed. The smooth extent of surface was soon lost : the pressure of the pieces of ice, by the violence of the swell, caused them to pack ; fragment rose upon fragment, till they were in many places higher than the main-yard. The movements of the ships were tremendous and involuntary, in conjunction with the surrounding ice, actuated by the currents. The water shoaled to 14 fathoms. The grounding of the ice or of the ships would have been equally fatal : the force of the ice might have crushed them to atoms, or have lifted them out of the water and overset them, or have left them suspended on the summits of the pieces of ice at a tremendous height, exposed to the fury of the winds, or to the risk of being dashed to pieces by the failure of their frozen dock. An attempt was made to cut a passage through the ice ; after a perseverance worthy of Britons it proved fruitless. The commander, at all times master of himself, directed the boats to be made ready to be hauled over the ice, till they arrived at navigable water (a task alone of seven days), and in them to make their voyage to England. The boats were drawn progressively three whole days. At length a wind sprung up, the ice separated sufficiently to yield to the pressure of the full-sailed ships, which, after labouring against the resisting fields of ice, arrived on the 10th of August in the harbour of Smeeringberg, at the west end of Spitzbergen, between it and Hackluyt's Headland.

The forms assumed by the ice in this chilling climate are extremely pleasing to even the most incurious eye. The surface of that which is congealed from the sea-water (for we must allow it two origins) is flat and even, hard, opaque, resembling white sugar, and incapable of being slid on like the British ice. The greater pieces, or fields, are many leagues in length : the lesser are the meadows of the seals, on which those animals at times frolic by hundreds. The motion of the lesser pieces is as rapid as the currents : the greater, which are sometimes 200 leagues long, and 60 or 80 broad, move slow and majestically ; often fix for a time, immovable by the power of the ocean, and then produce near the horizon that bright white appearance called the *blink*. The approximation of two great fields produces a most singular phenomenon ; it forces the lesser (if the term can be applied to pieces of several acres square) out of the water, and adds them to their surface : a second and often a third succeeds ; so that the whole forms an aggregate of a tremendous height. These float in the sea like so many rugged mountains, and are sometimes 500 or 600 yards thick ; but the far greater part is concealed beneath the water. These are continually increased in height by the freezing of the spray of the sea, or of the meltings of the snow, which falls on them. Those which remain in this frozen climate receive continual growth ; others are gradually wasted by the northern winds into southern latitudes, and melt by degrees by the heat of the sun, till they waste away, or disappear in the boundless element.

The collision of the great fields of ice, in high latitudes, is often attended with a noise that for a time takes away the sense of hearing any thing else ; and the lesser with a grinding of unspeakable horror. The water which dashes against the

mountainous ice freezes into an infinite variety of forms ; and gives the voyager ideal towns, streets, churches, steeples, and every shape which imagination can frame.

Ice-Plant. See *MISEMBRYANTHEMUM*.

ICEBERGS, are large bodies of ice filling the valleys between the high mountains in northern latitudes. Among the most remarkable are those of the east coast of Spitzbergen. They are seven in number, but at considerable distances from each other ; each fills the valleys for tracts unknown, in a region totally inaccessible in the internal parts. The glaciers of Switzerland (see *GLACIERS*) seem contemptible to these ; but present often a similar front into some lower valley. The last exhibits over the sea a front 300 feet high, emulating the emerald in colour : cataracts of melted snow precipitate down various parts, and black spiring mountains, streaked with white, bound the sides, and rise crag above crag, as far as eye can reach in the back ground. At times immense fragments break off, and tumble into the water with a most alarming dashing. In *Phipps's Voyage to the North Pole*, p. 70, we are told, a piece of this vivid green substance has fallen, and grounded in 24 fathoms water, and spired above the surface 50 feet. Similar icebergs are frequent in all the Arctic regions ; and to their lapses is owing the solid mountainous ice which infests those seas.—Frost sports wonderfully with these icebergs, and gives them majestic as well as other most singular forms. Masses have been seen assuming the shape of a Gothic church, with arched windows and doors, and all the rich drapery of that style, composed of what an Arabian tale would scarcely dare to relate, of crystal of the richest sapphirine blue : tables with one or more feet ; and often immense flat-roofed temples, like those of Luxor on the Nile, supported by round transparent columns of cœrulean hue, float by the astonished spectator. These icebergs are the creation of ages, and receive annually additional height by the falling of snows and of rain, which often instantly freezes, and more than repairs the loss occasioned by the influence of the melting sun.

ICELAND, a large island to the north of Europe, about 400 miles in length, and 150 in breadth. For two months together the sun never sets, and in the winter it never rises for the same space, at least not entirely. The middle of this island is mountainous, stony, and barren ; but in some places there are excellent pastures, and the grass has a fine smell. The ice, which gets loose from the more northern country in May, brings with it a large quantity of wood, and several animals, such as foxes, wolves, and bears. Mount Hecla is the most noted mountain, and is a volcano, which sometimes throws out sulphureous torrents (see the article *HUER*). The inhabitants believe that some of the souls of the damned go to this mountain, and that others are confined to the ice near this island. Their houses are scattered about, at a distance from each other, and many of them are deep in the ground ; but they are all miserable huts, covered with skins. Many of the inhabitants profess Christianity ; but those that live at a distance are Pagans. They are mostly clothed with the skins of beasts. The Danes trade with the natives for hides, tallow, train-oil, whalebone, and sea horses' teeth, which are as good as ivory. Iceland, which was considered by the ancients as the Ultima Thule, or the extremity of the world, and by us as scarcely habitable, once abounded in learning and science, at a time when great part of Europe was involved in darkness. Their language was the old Gothic or Teutonic, the vernacular tongue of the Swedes, Danes, and Norwegians, before it branched into the several dialects since spoken by the natives of those three kingdoms. N. lat. from 64. to 67.

ICELAND-Agate, a kind of precious stone met with in the islands of Iceland and Ascension, employed by the jewellers as



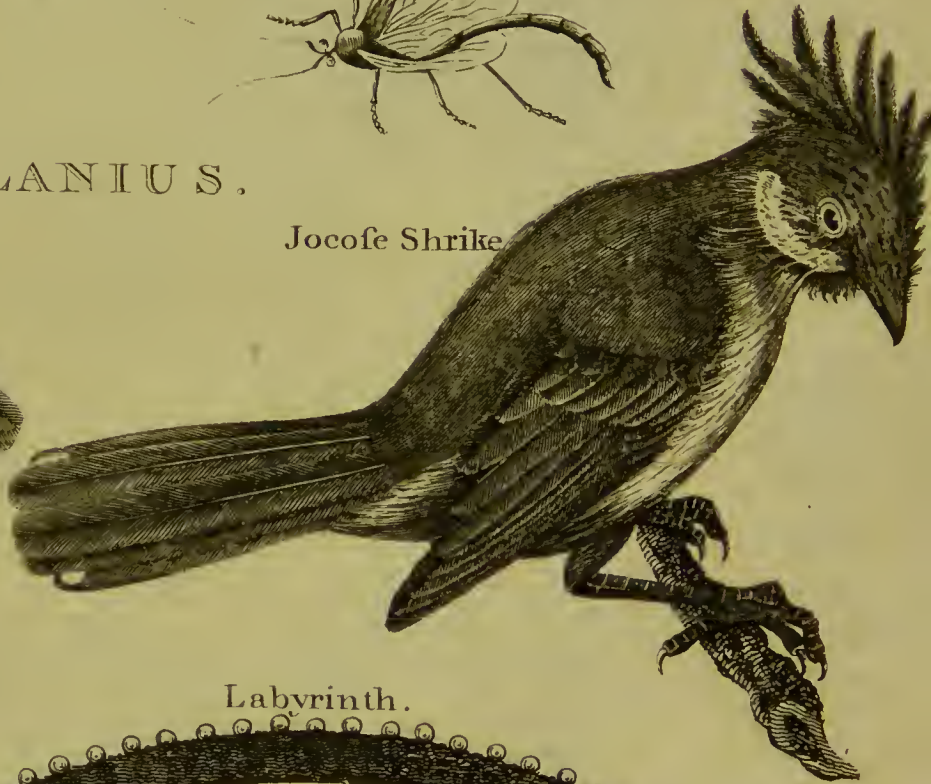
Dominican Shrike.



LANIUS.



Jocose Shrike

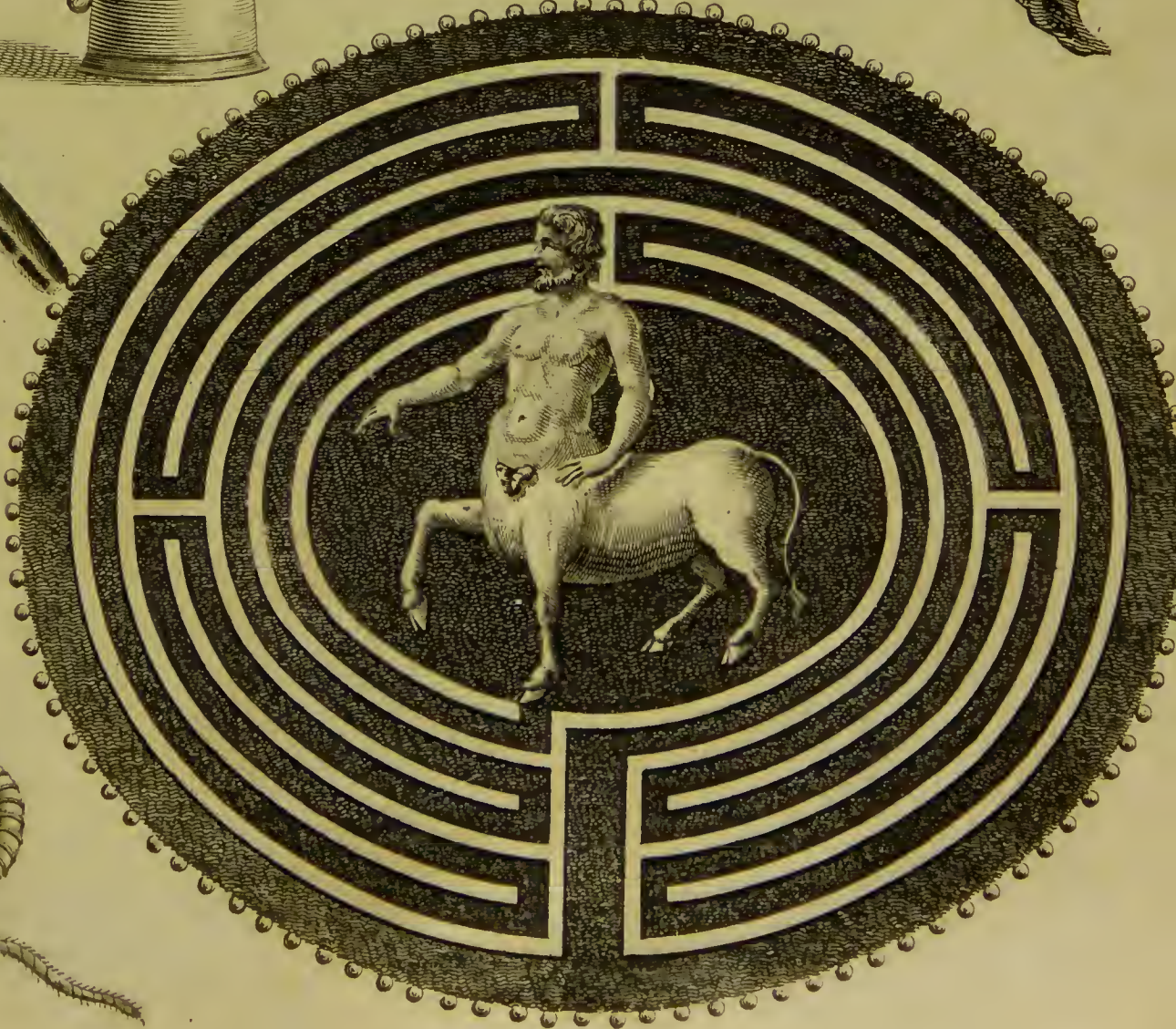


Antiguan Shrike.



Inhaler.

Labyrinth.



Jolloxochitl.



Iulus.



an agate, though too soft for the purpose. It is supposed to be a volcanic product; being solid, black, and of a glassy texture. When held between the eye and the light, it is semi-transparent, and greenish like the glass bottles which contain much iron. In the islands which produce it, such large pieces are met with that they cannot be equalled in any glass-house.

ICELAND (or *Island*) *Crystal*. See CRYSTAL (*Iceland*).

ICENI, the ancient name of the people of Suffolk, Norfolk, Cambridgeshire, and Huntingdonshire, in England.

ICH-DIEN. See HERALDRY, p. 216.

ICHNEUMON, in zoology. See VIVERRA.

ICHNEUMON is also the name of a genus of flies of the hymenoptera order. The mouth is armed with jaws, without any tongue: the antennæ have above 30 joints; the abdomen is generally petiolated, joined to the body by a pedicle or stalk; the tail is armed with a sting, which is enclosed in a double-valved cylindrical sheath; the wings are lanceolated and plain. This genus is exceedingly numerous. In Gmelin's or the 13th edition of the *Systema Naturæ*, no fewer than 415 species are enumerated. They are divided into families, from the colour of their scutellum and antennæ, as follow: 1. Those with a whitish scutcheon, and antennæ annulated with a whitish band. 2. Those which have a white scutcheon and antennæ entirely black. 3. With a scutcheon of the same colour as the thorax; the antennæ encompassed with a fillet. 4. With a scutcheon of the same colour as the thorax; and antennæ black and setaceous. 5. With setaceous clay-coloured antennæ. 6. With small filiform antennæ, and the abdomen oval and slender.

One distinguishing and striking character of these species of flies is the almost continual agitation of their antennæ. The name of *Ichneumon* has been applied to them, from the service they do us by destroying caterpillars, plant-lice, and other insects; as the ichneumon or mangouste destroys the crocodiles. The variety to be found in the species of ichneumons is prodigious: among the smaller species there are males who perform their amorous preludes in the most passionate and gallant manner. The posterior part of the females is armed with a winable, visible in some species, no ways discoverable in others; and that instrument, though so fine, is able to penetrate through mortar and plaster: the structure of it is more easily seen in the long wimbled fly. The food of the family to be produced by this fly is the larva of wasps or mason-bees: for it no sooner espies one of those nests, but it fixes on it with its wimble, and bores through the mortar of which it is built. The wimble itself, of an admirable structure, consists of three pieces; two collateral ones, hollowed out into a gutter, serve as a sheath, and contain a compact, solid, dentated stem, along which runs a groove that conveys the egg from the animal, who supports the wimble with its hinder legs, lest it should break; and by a variety of movements, which it dexterously performs, it bores through the building, and deposits one or more eggs, according to the size of the ichneumon, though the largest drop but one or two. Some agglutinate their eggs upon caterpillars; others penetrate through the caterpillar's eggs, though very hard, and deposit their own in the inside. When the larva is hatched, its head is so situated, that it pierces the caterpillar and penetrates to its very entrails. These larvæ pump out the nutritious juices of the caterpillar, without attacking the vitals of the creature, who appears healthy, and even sometimes transforms itself to a chrysalis. It is not uncommon to see those caterpillars fixed upon trees, as if they were sitting upon their eggs; and it is afterwards discovered that the larvæ, which were within their bodies, have spun their threads, with which, as with cords, the caterpillars are fastened down, and so perish miserably. The ichneumons performed special service in the years 1731 and 1732: by multiplying in the same proportion

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as did the caterpillars, their larvæ destroyed more of them than could be effected by human industry. Those larvæ, when on the point of turning into chrysalids, spin a silky cod. Nothing is more surprising and singular than to see those cods leap when placed on the table or hand. Plant-lice, the larvæ of the cuculiones, and spiders' eggs, are also sometimes the cradle of the ichneumon fly. Carcasses of plant-lice, void of motion, are often found on rose tree leaves; they are the habitation of a small larva, which, after having eaten up the entrails, destroys the springs and inward economy of the plant-lice, performs its metamorphosis under shelter of the pellicle which enfolds it, contrives itself a small circular outlet, and sallies forth into open air. There are ichneumons in the woods, who dare attack spiders, run them through with their sting, tear them to pieces, and thus avenge the whole nation of flies of so formidable a foe: others, destitute of wings (and those are females), deposit their eggs in spiders' nests. The ichneumon of the bedegnar, or sweet-briar sponge, and that of the rose-tree, perhaps only deposit their eggs in those places; because they find other insects on which they feed. The genus of the ichneumon-flies might with propriety be termed a race of diminutive cannibals.

ICHNOGRAPHY, in perspective, the view of any thing cut off by a plane, parallel to the horizon, just at the base of it. The word is derived from the Greek *ἰχνοῦς* *footstep*, and *γραφω* *I write*, as being a description of the footsteps or traces of a work. Among painters it signifies a description of images or of ancient statues of marble and copper, of busts and semi-busts, of paintings in fresco, mosaic works, and ancient pieces of miniature.

ICHOGLANS, the grand signior's pages serving in the seraglio. These are the children of Christian parents, either taken in war, purchased, or sent in presents from the viceroys and governors of distant provinces; they are the most sprightly, beautiful, and well-made that can be met with; and are always reviewed and approved of by the grand signior himself before they are admitted into the seraglios of Pera, Constantinople, or Adrianople, being the three colleges where they are educated, or fitted for employments, according to the opinion the court entertains of them.

ICHOR, in surgery, properly signifies a thin watery humour like serum, but is sometimes used for a thicker kind flowing from ulcers, called also *sanies*.

ICHTHYOCOLLA, ISINGLASS, a preparation from the fish known by the name of *buso*. See ACCIPENSER. The word is Greek, formed of *ἰχθυῦς* *fish*, and *κόλλα* *glue*.—The method of making isinglass was long a secret in the hands of the Russians, but was at length discovered, and the following account of it published by Humphrey Jackson, Esq. in the 63d volume of the Philosophical Transactions.

“All authors who have hitherto delivered processes for making ichthyocolla, fish-glue, or isinglass, have greatly mistaken both its constituent matter and preparation.

“To prove this assertion, it may not be improper to recite what Pomet says upon the subject, as he appears to be the principal author whom the rest have copied. After describing the fish, and referring to a cut engraved from an original in his custody, he says: ‘As to the manner of making the isinglass, the sinewy parts of the fish are boiled in water till all of them be dissolved that will dissolve; then the gluey liquor is strained, and set to cool. Being cold, the fat is carefully taken off, and the liquor itself boiled to a just consistency, then cut to pieces, and made into a twist, bent in form of a crescent, as commonly sold; then hung upon a string, and carefully dried.’

“From this account it might be rationally concluded, that every species of fish which contained gelatinous principles would yield isinglass: and this parity of reasoning seems to have

given rise to the hasty conclusions of those who strenuously vouch for the extraction of isinglass from sturgeon; but as that fish is easily procurable, the negligence of ascertaining the fact by experiment seems inexcusable.

" In my first attempt to discover the constituent parts and manufacture of isinglass, relying too much upon the authority of some chemical authors whose veracity I had experienced in many other instances, I found myself constantly disappointed. Glue, not isinglass, was the result of every process; and although, in the same view, a journey to Russia proved fruitless, yet a steady perseverance in the research proved not only successful as to this object, but, in the pursuit, to discover a resinous matter plentifully procurable in the British fisheries, which has been found by ample experience to answer similar purposes. It is now no longer a secret, that our lakes and rivers in North America are stocked with immense quantities of fish, said to be the same species with those in Muscovy, and yielding the finest isinglass; the fisheries whereof, under due encouragement, would doubtless supply all Europe with this valuable article.

" No artificial heat is necessary to the production of isinglass, neither is the matter dissolved for this purpose; for, as the continuity of its fibres would be destroyed by solution, the mass would become brittle in drying, and snap short asunder, which is always the case with glue, but never with isinglass. The latter, indeed, may be dissolved into glue with boiling water; but its fibrous recombination would be found impracticable afterwards, and a fibrous texture is one of the most distinguishing characteristics of genuine isinglass.

" A due consideration that an imperfect solution of isinglass, called *fining* by the brewers, possessed a peculiar property of clarifying malt-liquors, induced me to attempt its analysis in cold subacid menstrua. One ounce and an half of good isinglass, steeped a few days in a gallon of stale beer, was converted into good fining, of a remarkably thick consistence: the same quantity of glue, under similar treatment, yielded only a mucilaginous liquor, resembling diluted gum-water, which, instead of clarifying beer, increased both its tenacity and turbidness, and communicated other properties in no respect corresponding with those of genuine fining. On commixing three spoonfuls of the solution of isinglass with a gallon of malt liquor, in a tall cylindrical glass, a vast number of curdly masses became presently formed, by the reciprocal attraction of the particles of isinglass and the feculencies of the beer, which, increasing in magnitude and specific gravity, arranged themselves accordingly, and fell in a combined state to the bottom, through the well known laws of gravitation; for, in this case, there is no elective attraction, as some have imagined, which bears the least affinity with what frequently occurs in chemical decompositions.

" If what is commercially termed *long* or *short stapled isinglass* be steeped a few hours in fair cold water, the entwisted membranes will expand, and reassume their original beautiful hue, and, by a dexterous address, may be perfectly unfolded. By this simple operation, we find that isinglass is nothing more than certain membranous parts of fishes, divested of their native mucosity, rolled and twisted into the forms above mentioned, and dried in open air.

" The sounds, or air-bladders, of fresh-water fish in general are preferred for this purpose, as being the most transparent, flexible, delicate substances. These constitute the finest sorts of isinglass; those called *book* and *ordinary staple* are made of the intestines, and probably of the peritonæum of the fish. The belluga yields the greatest quantity, as being the largest and most plentiful fish in the Muscovy rivers; but the sounds of all fresh-water fish yield, more or less, fine isinglass, particularly the smaller sorts, found in prodigious quantities in the Caspian sea, and several hundred miles beyond Astracan, in the

Wolga, Yaik, Don, and even as far as Siberia, where it is called *kla* or *kla* by the natives, which implies a glutinous matter; it is the basis of the Russian glue, which is preferred to all other kinds for its strength.

" The sounds, which yield the finer isinglass, consist of parallel fibres, and are easily rent longitudinally; but the ordinary sorts are found composed of double membranes, whose fibres cross each other obliquely, resembling the coats of a bladder: hence the former are more readily pervaded and divided with subacid liquors; but the latter, through a peculiar kind of interwoven texture, are with great difficulty torn asunder, and long resist the power of the same menstruum; yet, when duly resolved, are found to act with equal energy in clarifying liquors.

" Isinglass receives its different shapes in the following manner: The parts of which it is composed, particularly the sounds, are taken from the fish while sweet and fresh, slit open, washed from their slimy *fordes*, divested of every thin membrane which envelops the sound, and then exposed to stiffen a little in the air. In this state, they are formed into rolls about the thickness of a finger, and in length according to the intended size of the staple: a thin membrane is generally selected for the centre of the roll, round which the rest are folded alternately, and about half an inch of each extremity of the roll is turned inwards. The due dimensions being thus obtained, the two ends of what is called *short staple* are pinned together with a small wooden peg; the middle of the roll is then pressed a little downwards, which gives it the resemblance of a heart-shape; and thus it is laid on boards, or hung up in the air to dry. The sounds which compose the long staple are longer than the former; but the operator lengthens this sort at pleasure, by interfolding the ends of one or more pieces of the sound with each other. The extremities are fastened with a peg, like the former; but the middle part of the roll is bent more considerably downwards; and, in order to preserve the shape of the three obtuse angles thus formed, a piece of round stick, about a quarter of an inch diameter, is fastened in each angle with small wooden pegs, in the same manner as the ends. In this state, it is permitted to dry long enough to retain its form, when the pegs and sticks are taken out, and the drying completed: lastly, the pieces of isinglass are colligated in rows, by running packthread through the peg-holes, for convenience of package and exportation.

" The membranes of the *book* sort, being thick and refractory, will not admit a similar formation with the preceding; the pieces, therefore, after their sides are folded inwardly, are bent in the centre in such manner that the opposite sides resemble the cover of a book; from whence its name: a peg being run across the middle, fastens the sides together, and thus it is dried like the former. This sort is interleaved, and the pegs run across the ends, the better to prevent its unfolding.

" That called *cake isinglass* is formed of the bits and fragments of the staple sorts, put into a flat metalline pan, with a very little water, and heated just enough to make the parts cohere like a pancake when it is dried; but frequently it is overheated, and such pieces, as before observed, are useless in the business of fining. Experience has taught the consumers to reject them.

" Isinglass is best made in the summer, as frost gives it a disagreeable colour, deprives it of weight, and impairs its gelatinous principles; its fashionable forms are unnecessary, and frequently injurious to its native qualities. It is common to find oily putrid matter, and *exuvie* of insects, between the implicated membranes, which, through the inattention of the cellarman, often contaminate wines and malt liquors in the act of clarification. These peculiar shapes might, probably, be introduced originally with a view to conceal and disguise.

the real substance of isinglass, and preserve the monopoly; but, as the mask is now taken off, it cannot be doubted to answer every purpose more effectually in its native state, without any subsequent manufacture whatever, especially to the principal consumers, who hence will be enabled to procure sufficient supply from the British colonies. Until this laudable end can be fully accomplished, and as a species of isinglass, more easily producible from the marine fisheries, may probably be more immediately encouraged, it may be manufactured as follows:

"The sounds of cod and ling bear great analogy with those of the *accipenser* genus of Linnæus and Artdi; and are in general so well known as to require no particular description. The Newfoundland and Iceland fishermen split open the fish as soon as taken, and throw the back bones, with the sounds annexed, in a heap; but previous to incipient putrefaction, the sounds are cut out, washed from their slimes, and salted for use. In cutting out the sounds, the intercostal parts are left behind, which are much the best: the Iceland fishermen are so sensible of this, that they beat the bone upon a block with a thick stick, till the pockets, as they term them, come out easily, and thus preserve the sound entire. If the sounds have been cured with salt, that must be dissolved by steeping them in water before they are prepared for isinglass; the fresh sound must then be laid upon a block of wood, whose surface is a little elliptical, to the end of which a small hair-brush is nailed, and with a saw-knife the membranes on each side of the sound must be scraped off. The knife is rubbed upon the brush occasionally, to clear its teeth; the pockets are cut open with scissors, and perfectly cleansed of the mucous matter with a coarse cloth; the sounds are afterwards washed a few minutes in lime-water in order to absorb their oily principle, and lastly in clear water. They are then laid upon nets to dry in the air; but if intended to resemble the foreign isinglass, the sounds of cod will only admit of that called *book*, but those of ling both shapes. The thicker the sounds are, the better the isinglass, colour excepted; but that is immaterial to the brewer, who is its chief consumer.

"This isinglass resolves into fining, like the other sorts, in subacid liquors, as stale beer, cyder, old hock, &c. and in equal quantities produces similar effects upon turbid liquors, except that it falls speedier and closer to the bottom of the vessel, as may be demonstrated in tall cylindrical glasses; but foreign isinglass retains the consistency of fining preferably in warm weather, owing to the greater tenacity of its native mucilage.

"Vegetable acids are, in every respect, best adapted to fining: the mineral acids are too corrosive, and even insalubrious, in common beverage.

"It is remarkable, that, during the conversion of isinglass into fining, the acidity of the menstruum seems greatly diminished, at least to taste; not on account of any alkaline property in the isinglass, probably, but by its enveloping the acid particles. It is likewise reducible into jelly with alkaline liquors, which indeed are solvents of all animal matters; even cold lime-water dissolves it into a pulpy *magma*. Notwithstanding this is inadmissible as fining, on account of the menstruum, it produces admirable effects in other respects: for, on commixture with compositions of plaster, lime, &c. for ornamenting walls exposed to vicissitudes of weather, it adds firmness and permanency to the cement; and if common brick-mortar be worked up with this jelly, it soon becomes almost as hard as the brick itself: but for this purpose it is more commodiously prepared, by dissolving it in cold water acidulated with vitriolic acid; in which case the acid quits the jelly, and forms with the lime a *selenitic* mass, while, at the same time, the jelly being deprived in some measure of its moisture, through the formation of an indissoluble concrete amongst its

parts, soon dries, and hardens into a firm body; whence its superior strength and durability are easily comprehended.

"It has long been a prevalent opinion, that sturgeon, on account of its cartilaginous nature, would yield great quantities of isinglass; but, on examination, no part of this fish, except the inner coat of the sound, promised the least success. This being full of *rugæ*, adheres so firmly to the external membrane, which is useless, that the labour of separating them supercedes the advantage. The intestines, however, which in the larger fish extend several yards in length, being cleansed from their mucus, and dried, were found surprisingly strong and elastic, resembling cords made with the intestines of other animals, commonly called *cat gut*, and, from some trials, promised superior advantages when applied to mechanic operations."

Isinglass is sometimes used in medicine; but its effects are trifling, and merely to be attributed to its nutritious properties. Women subject to the *fluor albus* are in the habit of taking it dissolved in milk.

ICHTHYOLOGY, the science of fishes, or that part of zoology which treats of fishes. See FISH. Fishes form the fourth class of animals in the Linnæan system. This class is there arranged into six orders, under three great divisions; none of which, however, include the cetaceous tribes, or the whale, dolphin, &c. these forming an order of the class MAMMALIA in the same system. See ZOOLOGY.

Mr. Pennant, in his British Zoology, makes a different and very judicious arrangement, by which the cetæ are restored to their proper rank. He distributes fish into three divisions, comprehending six orders. His divisions are, into *Cetaceous*, *Cartilaginous*, and *Bony*.

Div. I. CETACEOUS Fish; the characters of which are the following: No gills; an orifice on the top of the head, through which they breathe and eject water; a flat or horizontal tail; exemplified under *Ichthyology* in Plate 23, by the Beaked Whale, figure 1, borrowed from Dale's Hist. Harw. 411. Tab. xiv.—This division comprehends three genera; the Whale, Cachalot, and Dolphin.

Div. II. CARTILAGINOUS Fish; the characters of which are: Breathing through certain apertures, generally placed on each side the neck; but in some instances beneath, in some above, and from one to seven in number on each part, except in the pipe-fish, which has only one; the muscles supported by cartilages instead of bones. Example, the Picked Dog-fish, fig. 2. *a*, The lateral apertures.—The genera are, the Lamprey, Skate, Shark, Fishing-frog, Sturgeon, Sun-fish, Lump-fish, Pipe-fish.

Div. III. BONY Fish; includes those whose muscles are supported by bones or spines, which breathe through gills covered or guarded by thin bony plates, open on the side, and dilatable by means of a certain row of bones on their lower part, each separated by a thin web; which bones are called the *radii brachioستيגי*, or the *gill-covering rays*. The tails of all the fish that form this division are placed in a situation perpendicular to the body; and this is an invariable character.

The great sections of the Bony Fish into *Apodal*, *Thoracic*, *Jugular*, and *Abdominal*, he copies from Linnæus, who founds this system on a comparison of the ventral fins to the feet of land-animals or reptiles; and either from the want of them, or their particular situation in respect to the other fins, establishes his sections.—In order to render them perfectly intelligible, it is necessary to refer to those several organs of movement, and some other parts, in a perfect fish, or one taken out of the three last sections. In fig. 4. (the Haddock), *a*, is the pectoral fins; *b*, ventral fins; *c*, anal fins; *d*, caudal fin, or the tail; *e, e, e*, dorsal fins; *f*, bony plates that cover the gills; *g*, branchiostegous rays and their membranes; *h*, the lateral or side line.

SECT. 1. **APODAL**: The most imperfect, wanting the ventral fins; illustrated by the Conger, fig. 3. This also expresses the union of the dorsal and anal fins with the tail, as is found in some few fish.—Genera: The Eel, Wolf-fish, Launce, Morris, Sword fish.

SECT. 2. **JUGULAR**: The ventral fins *b*, placed before the pectoral fins *a*, as in the Haddock, fig. 4.—Genera: The Dragonet, Weever, Codfish, Blenny.

SECT. 3. **THORACIC**: The ventral fins *a*, placed beneath the pectoral fins *b*, as in the Father Lasher, fig. 5.—Genera: The Goby, Bull-head, Doree, Flounder, Gilt-head, Wrasse, Perch, Stickleback, Mackarel, Surmullet, Gurnard.

SECT. 4. **ABDOMINAL**: The ventral fins placed behind the pectoral fins, as in the Minow, fig. 6.—Genera: The Loche, Salmon, Pike, Argentine, Atherine, Mullet, Flying-fish, Herring, Carp.

Naturalists observe an exceeding great degree of wisdom in the structure of fishes, and in their conformation to the element in which they are to live. Most of them have the same external form, sharp at either end, and swelling in the middle, by which they are enabled to traverse the fluid in which they reside with greater velocity and ease. This shape is in some measure imitated by men in those vessels which they design to sail with the greatest swiftness; but the progress of the swiftest sailing ship is far inferior to that of fishes. Any of the large fishes overtake a ship in full sail with the greatest ease, play round it as though it did not move at all, and can get before it at pleasure.

The chief instruments of a fish's motion have been supposed to be the fins; which in some are much more numerous than in others. A fish completely fitted for swimming with rapidity, is generally furnished with two pair of fins on the sides, and three single ones, two above and one below. But it does not always happen that the fish which has the greatest number of fins is the swiftest swimmer. The shark is thought to be one of the swiftest fishes, and yet it has no fins on its belly; the haddock seems to be more completely fitted for motion, and yet it does not move so swiftly. It is even observable, that some fishes which have no fins at all, such as lobsters, dart forward with prodigious rapidity, by means of their tail; and the instrument of progressive motion, in all fishes, is now found to be the tail. The great use of the fins is to keep the body *in equilibrio*: and if the fins are cut off, the fish can still swim; but will turn upon its sides or its back, without being able to keep itself in an erect posture as before. If the fish desires to turn, a blow from the tail sends it about in an instant; but if the tail strikes both ways, then the motion is progressive.

All fishes are furnished with a slimy glutinous matter, which defends their bodies from the immediate contact of the surrounding fluid, and which likewise, in all probability, assists their motion through the water. Beneath this, in many kinds, is found a strong covering of scales, which like a coat of mail defends it still more powerfully; and under that, before we come to the muscular parts of the body, lies an oily substance, which also tends to preserve the requisite warmth and vigour.

By many naturalists fishes are considered as of a nature very much inferior to land animals, whether beasts or birds. Their sense of feeling, it is thought, must be very obscure on account of the scaly coat of mail in which they are wrapped up. The sense of smelling also, it is said, they can have only in a very small degree. All fishes, indeed, have one or more nostrils; and even those that have not the holes perceptible without, yet have the bones within properly formed for smelling. But as the air is the only medium we know proper for the distribution of odours, it cannot be supposed that these animals which reside constantly in the water can be affected by them. As to tasting, they seem to make very little distinction. The palate of most fishes is hard

and bony, and consequently incapable of the powers of relishing different substances; and accordingly these voracious animals have often been observed to swallow the fishermen's plummet instead of the bait. Hearing is generally thought to be totally deficient in fishes, notwithstanding the discoveries of some anatomists, who pretend to have found out the bones designed for the organ of hearing in their heads. They have no voice, it is said, to communicate with each other, and consequently have no need of an organ for hearing. Sight seems to be that sense of which they are possessed in the greatest degree; and yet even this seems obscure, if we compare it with that of other animals. The eye, in almost all fishes, is covered with the same transparent skin which covers the rest of the head, and which probably serves to defend it in the water, as they are without eyelids. The globe is more depressed anteriorly, and is furnished behind with a muscle which serves to lengthen or flatten it as there is occasion. The crystalline humour, which in quadrupeds is flat, and of the shape of a button-mould, or like a very convex lens, in fishes is quite round, or sometimes oblong like an egg. Hence it is thought that fishes are extremely near-sighted; and that, even in the water, they can perceive objects only at a very small distance. Hence, say they, it is evident how far fishes are below terrestrial animals in their sensations, and consequently in their enjoyments. Even their brain, which is by some supposed to be of a size with every creature's understanding, shows that fishes are very much inferior to birds in this respect.

Others argue differently with regard to the nature of fishes. With respect to the sense of feeling, say they, it cannot be justly argued that fishes are deficient merely because they are covered with scales, as it is possible these scales may be endued with as great a power of sensation as we can imagine. The sense of feeling is not properly connected with *softness* in any organ, more than with *hardness* in it. A similar argument may be used with regard to smelling; for though we do not know how smells can be propagated in water, that is by no means a proof that they are not so. On the contrary, as water is found to be capable of absorbing putrid effluvia from the air, nothing is more probable than that these putrid effluvia, when mixed with the water, would affect the olfactory organs of fishes, as well as they affect ours when mixed with the air. With regard to taste, it certainly appears, that fishes are able to distinguish their proper food from what is improper, as well as other animals. Indeed no voracious animal seems to be endued with much sensibility in this respect; nor would it probably be consistent with that way of promiscuously devouring every creature that comes within its reach, without which these kinds of animals could not subsist.

With respect to the *bearing of fishes*, it is urged, that, when kept in a pond, they may be made to answer at the call of a whistle or the ringing of a bell; and they will even be terrified at any sudden and violent noise, such as thunder, the firing of guns, &c. and shrink to the bottom of the water. Among the ancients, many were of opinion that fishes had the sense of hearing, though they were by no means satisfied about the ways or passages by which they heard. Placentini afterwards discovered some bones in the head of the pike, which had very much the appearance of being organs of hearing, though he could never discover any external passage to them. Klein affirmed, from his own experiments and observations, that all fishes have the organs of hearing; and have also passages from without to these organs, though in many species they are difficult to be seen; and that even the most minute and obscure of these are capable of communicating a tremulous motion to those organs, from sounds issuing from without. This is likewise asserted by M. Geoffroy, (*Dissertation sur l'organe de l'ouïe*, p. 97 et seq.) who gives a particular description of the organs of hearing belonging to several species. These organs are a set of little bones ex-

remely hard, and white, like fine porcelain, which are to be found in the heads of all fishes: the external auditory passages are very small, being scarcely sufficient to admit a hog's bristle; though with care they may be distinguished in almost all fishes. It can by no means be thought that the water is an improper medium of sound, seeing daily experience shows us that sounds may be conveyed not only through water, but through the most solid bodies. See *ACOUSTICS*. It seems indeed very difficult to determine the matter by experiment. Mr. Gouan, who kept some gold fishes in a vase, informs us, that whatever noise he made, he could neither terrify nor disturb them: he holla'd as loud as he could, putting a piece of paper between his mouth and the water, to prevent the vibrations from affecting the surface, and the fishes still seemed insensible; but when the paper was removed, and the sound had its full effect on the water, the case was then altered, and the fishes instantly sunk to the bottom. This experiment, however, or others similar to it, cannot prove that the fishes did not hear the sounds before the paper was removed; it only shows that they were not alarmed till a sensible vibration was introduced into the water. The call of a whistle may also be supposed to affect the water in a fish-pond with a vibratory motion: but this certainly must be very obscure; and if fishes can be assembled in this manner when no person is in sight, it amounts to a demonstration that they actually do hear. See *COMPARATIVE Anatomy*, p. 657.

The arguments used against the sight of fishes are the weakest of all. Many instances, which daily occur, show that fishes have a very acute sight, not only of objects in the water, but of those in the air. Their jumping out of the water in order to catch flies is an abundant proof of this: and this they will continue to do in a fine summer evening, even after it is so dark that we cannot distinguish the insects they attempt to catch.

Though fishes are formed for living entirely in the water, yet they cannot subsist without air. On this subject Mr. Hawksbee made several experiments, which are recorded in the *Philosophical Transactions*. The fishes he employed were gudgeons; a species that are very lively in the water, and can live a considerable time out of it. Three of them were put into a glass vessel with about three pints of fresh water, which was designed as a standard to compare the others by. Into another glass, to a like quantity of water, were put three more gudgeons, and thus the water filled the glass to the very brim. Upon this he screwed down a brass-plate with a leather below, to prevent any communication between the water and the external air; and, that it might the better resemble a pond frozen over, he suffered as little air as possible to remain on the surface of the water. A third glass had the same quantity of water put into it; which, first by boiling, and then by continuing it a whole night *in vacuo*, was purged of its air as well as possible; and into this also were put three gudgeons. In about half an hour, the fishes in the water from whence the air had been exhausted, began to discover some signs of uneasiness by a more than ordinary motion in their mouths and gills. Those who had no communication with the external air would at this time also frequently ascend to the top, and suddenly swim down again: and in this state they continued for a considerable time, without any sensible alteration. About five hours after this observation, the fishes in the exhausted water were not so active as before, upon shaking the glass which contained them. In three hours more, the included fishes lay all at the bottom of the glass with their bellies upwards; nor could they be made to shake their fins or tail by any motion given to the glass. They had a motion with their mouths, however, which showed that they were not perfectly dead. On uncovering the vessel which contained them, they revived in two or three hours, and were perfectly well next morning; at which time those in the exhausted water were also recovered. The vessel containing these last being put under the

receiver of an air-pump, and the air exhausted, they all instantly died. They continued at top while the air remained exhausted, but sunk to the bottom on the admission of the atmosphere.

The use of air to fishes is very difficult to be explained; and indeed their method of obtaining the supply of which they stand constantly in need, is not easily accounted for. The motion of the gills in fishes is certainly analogous to our breathing, and seems to be the operation by which they separate the air from the water. Their manner of breathing is as follows: The fish first takes a quantity of water by the mouth, which is driven to the gills; these close, and keep the water which is swallowed from returning by the mouth, while the bony covering of the gills prevents it from going through them till the animal has drawn the proper quantity of air from it: then the bony covers open, and give it a free passage; by which means also the gills are again opened, and admit a fresh quantity of water. If the fish is prevented from the free play of its gills, it soon falls into convulsions, and dies. But though this is a pretty plausible explanation of the respiration of fishes, it remains a difficulty not easily solved what is done with this air. There seems to be no receptacle for containing it, except the air-bladder or swim; which, by the generality of modern philosophers, is destined not to answer any vital purpose, but only to enable the fish to rise or sink at pleasure.

The *air-bladder* is a bag filled with air, composed sometimes of one, sometimes of two, and sometimes of three divisions, situated towards the back of the fish, and opening into the maw or the gullet. The use of this in raising or depressing the fish is proved by the following experiment: A carp being put into the air-pump, and the air exhausted, the bladder is said to burst by the expansion of the air contained in it; after which, the fish can no more rise to the top, but ever afterwards crawls at the bottom. The same thing also happens when the air-bladder is pricked or wounded in such a manner as to let the air out; in these cases also the fish continues at the bottom, without a possibility of rising to the top. From this it is inferred, that the use of the air-bladder is, by swelling at the will of the animal, to increase the surface of the fish's body, and, thence diminishing its specific gravity, to enable it to rise to the top of the water, and to keep there at pleasure. On the contrary, when the fish wants to descend, it is thought to contract the air-bladder; and being thus rendered specifically heavier, it descends to the bottom.

The ancients were of opinion, that the air-bladder in fishes served for some purposes essentially necessary to life: and Dr. Priestley also conjectures, that the raising or depressing the fish is not the only use of these air-bladders, but that they also may serve some other purposes in the æconomy of fishes. There are many arguments indeed to be used on this side of the question: the most conclusive of which is, that all the cartilaginous kind of fishes want air-bladders, and yet they rise to the top or sink to the bottom of the water without any difficulty; and though most of the eel-kind have air bladders, yet they cannot raise themselves in the water without great difficulty.

Fishes are remarkable for their *longevity*. "Most of the disorders incident to mankind (says Bacon) arise from the changes and alterations in the atmosphere; but fishes reside in an element little subject to change: theirs is an uniform existence; their movements are without effort, and their life without labour. Their bones also, which are united by cartilages, admit of indefinite extension; and the different sizes of animals of the same kind, among fishes, is very various. They still keep growing: their bodies, instead of insinuating the rigidity of age, which is the cause of the natural decay of land animals, still continue increasing with fresh supplies; and as the body grows, the conduits of life furnish their stores in greater abundance.

How long a fish, that seems to have scarce any bounds put to its growth, continues to live, is not ascertained; perhaps the life of a man would not be sufficient to measure that of the smallest." There have been two methods fallen upon for determining the age of fishes; the one is by the circles of the scales, the other by the transverse section of the back bone. When a fish's scale is examined by a microscope, it is found to consist of a number of circles one within another, in some measure resembling those which appear on the transverse section of a tree, and is supposed to give the same information. For, as in trees, we can tell their age by the number of their circles; so, in fishes, we can tell theirs by the number of circles in every scale, reckoning one ring for every year of the animal's existence. The age of fishes that want scales may be known by the other method, namely, by separating the joints of the back-bone, and then minutely observing the number of rings which the surface, where it was joined, exhibits.

Fishes are, in general, the most voracious animals in nature. In most of them, the maw is placed next the mouth; and, though possessed of no sensible heat, is endowed with a very surprising faculty of digestion. Its digestive power seems, in some measure, to increase in proportion to the quantity of food with which the fish is supplied. A single pike has been known to devour 100 roaches in three days. Whatever is possessed of life seems to be the most desirable prey for fishes. Some that have very small mouths feed upon worms, and the spawn of other fish: others, whose mouths are larger, seek larger prey; it matters not of what kind, whether of their own species or any other. Those with the largest mouths pursue almost every thing that hath life; and often meeting each other in fierce opposition, the fish with the largest swallow comes off with the victory, and devours its antagonist. As a counterbalance to this great voracity, however, fishes are incredibly prolific. Some bring forth their young alive, others produce only eggs: the former are rather the least fruitful; yet even these produce in great abundance. The viviparous blenny, for instance, brings forth 200 or 300 at a time. Those which produce eggs, which they are obliged to leave to chance, either on the bottom where the water is shallow, or floating on the surface where it is deeper, are all much more prolific, and seem to proportion their stock to the danger there is of consumption. Lewenhoeck assures us, that the cod spawns above nine millions in a season. The flounder commonly produces above one million, and the mackerel above 500,000. Scarce one in 100 of these eggs, however, brings forth an animal: they are devoured by all the lesser fry that frequent the shores, by water-fowl in shallow waters, and by the larger fishes in deep waters. Such a prodigious increase, if permitted to come to maturity, would overstock nature; even the ocean itself would not be able to contain, much less provide for, one-half of its inhabitants. But two wise purposes are answered by this amazing increase; it preserves the species in the midst of numberless enemies, and serves to furnish the rest with a sustenance adapted to their nature.

With respect to the generation of many kinds of fishes, the common opinion is, that the female deposits her spawn or eggs, and that the male afterwards ejects his sperm or male semen upon it in the water. The want of the organs of generation in fishes gives an apparent probability to this: but it is strenuously opposed by Linnæus. He affirms, that there can be no possibility of impregnating the eggs of any animal out of its body. To confirm this, the general course of nature, not only in birds, quadrupeds, and insects, but even in the vegetable world, has been called in to his assistance, as proving that all impregnation is performed while the egg is in the body of its parent: and he supplies the want of the organs of generation by a very strange process, affirming, that the males eject their semen always some days before the females deposit their ova or

spawn; and that the females swallow this, and thus have their eggs impregnated with it. He says, that he has frequently seen at this time three or four females gathered about a male, and greedily snatching up into their mouths the semen he ejects. He mentions some of the efores, some perch, and some of the cyprini, in which he had seen this process. But see *COMPARATIVE Anatomy*, p. 256.

Many opinions have been started in order to account how it happens that fishes are found in pools and ditches on high mountains and elsewhere. But Gmelin observes, that the duck-kind swallow the eggs of fishes; and that some of these eggs go down and come out of their bodies unhurt, and so are propagated just in the same manner as has been observed of plants. For a more particular view of the structure of fishes, see *COMPARATIVE Anatomy*, Part III.

ICHTHYOPHAGI, FISH-EATERS, a name given to a people, or rather to several different people, who lived wholly on fishes. The word is Greek, compounded of *ιχθυος*; *piscis*, "fish," and *φαγειν edere*, "to eat." The Ichthyophagi spoken of by Ptolemy are placed by Sanson in the provinces of Nanquin and Xantong. Agatharcides calls all the inhabitants between Carmania and Gedrosia by the name *Ichthyophagi*. From the accounts given us of the Ichthyophagi by Herodotus, Strabo, Solinus, Plutarch, &c. it appears indeed that they had cattle, but that they made no use of them, excepting to feed their fish withal. They made their houses of large fish-bones, the ribs of whales serving them for their beams. The jaws of these animals served them for doors; and the mortars wherein they pounded their fish, and baked it at the sun, were nothing else but their vertebræ.

ICHTHYPERIA, in natural history, a name given by Dr. Hill to the bony palates and mouths of fishes, usually met with either fossil, in single pieces, or in fragments. They are of the same substance with the bufontiæ; and are of very various figures, some broad and short, others longer and slender; some very gibbous, and others plainly arched. They are likewise of various sizes, from the tenth of an inch to two inches in length, and an inch in breadth.

ICKENILD-STREET, is that old Roman highway, denominated from the Icenians, which extended from Yarmouth in Norfolk, the east part of the kingdom of the Iceni, to Barley in Hertfordshire, giving name in the way to several villages, as Ickworth, Icklingham, and Ickleton in that kingdom. From Barley to Roydon it divides the counties of Cambridge and Hertford. From Ickleford it runs by Tring, crosses Bucks and Oxfordshire, passes the Thames at Goring, and extends to the west part of England.

ICOLMKILL, formerly IONA, a noted little island, one of the Hebrides, near the S. W. point of the Isle of Mull. It is about three miles long and one broad. On this island, which is very fertile, are a mean village, and the ruins of an august monastery and cathedral, said to have been founded by St. Columba, where there are three royal chapels, or rather cemeteries, in which several ancient kings of Scotland, Ireland, and Norway are buried. In former times, this island was the place where the archives of Scotland, and many valuable and ancient MSS. were kept. Many of these, it is said, were carried to the Scotch College at Douay in France. This once celebrated seat of royalty and learning is now almost destitute of an instructor to teach the people the common duties of religion.

ICONIUM, at present COGN, formerly the capital city of Lycaonia in Asia Minor. St. Paul coming to Iconium (Acts xiii. 51. xiv. 1. &c.) in the year of Christ 45, converted many Jews and Gentiles there. It is believed that, in his first journey to this city, he converted St. Thecla, so celebrated in the writings of the ancient fathers. But some incredulous Jews excited the Gentiles to rise against Paul and Barnabas, so that they were upon the point of offering violence to them; which obliged

St. Paul and St. Barnabas to fly for security to the neighbouring cities. St. Paul undertook a second journey to Iconium in the year 51; but we know no particulars of his journey, which relate peculiarly to Iconium.

ICONOCLASTES, or **ICONOCLASTÆ**, breakers of images; a name which the church of Rome gives to all who reject the use of images in religious matters. The word is Greek, formed from *εικων* *imago*, and *κλῆζειν* *rumperé*, "to break." In this sense, not only the reformed but some of the eastern churches are called *Iconoclastes*, and esteemed by them heretics, as opposing the worship of the images of God and the Saints, and breaking their figures and representations in churches.

The opposition to images began in Greece under the reign of Bardanes, who was created emperor of the Greeks a little after the commencement of the eighth century, when the worship of them became common. See **IMAGE**. But the tumults occasioned by it were quelled by a revolution, which in 713 deprived Bardanes of the imperial throne. The dispute, however, broke out with redoubled fury under Leo the Isaurian, who issued an edict in the year 726, abrogating, as some say, the worship of images, and ordering all the images, except that of Christ's crucifixion, to be removed out of the churches; but according to others, this edict only prohibited the paying to them any kind of adoration or worship. This edict occasioned a civil war, which broke out in the islands of the Archipelago, and, by the suggestions of the priests and monks, ravaged a part of Asia, and afterwards reached Italy. The civil commotions and insurrections in Italy were chiefly promoted by the Roman pontiffs Gregory I. and II. Leo was excommunicated, and his subjects in the Italian provinces violated their allegiance, and, rising in arms, either massacred or banished all the emperor's deputies and officers. In consequence of these proceedings, Leo assembled a council at Constantinople in 730, which degraded Germanus, the bishop of that city, who was a patron of images; and he ordered all the images to be publicly burnt, and inflicted a variety of severe punishments upon such as were attached to that idolatrous worship. Hence arose two factions; one of which adopted the adoration and worship of images, and on that account were called *iconoduli* or *iconolitræ*; and the other maintained that such worship was unlawful, and that nothing was more worthy the zeal of Christians than to demolish and destroy those statues and pictures which were the occasions of this gross idolatry; and hence they were distinguished by the titles of *iconomachi* (from *εικων* *image*, and *μαχην* *I contend*;) and *iconoclastæ*. The zeal of Gregory II. in favour of image worship was not only imitated, but even surpassed, by his successor Gregory III. in consequence of which the Italian provinces were torn from the Grecian empire.

Constantine, called *C pronymus*, from *κερος* "stercus," and *ονομα* "name," because he was said to have defiled the sacred font at his baptism, succeeded his father Leo in 741, and in 754 convened a council at Constantinople, regarded by the Greeks as the seventh œcumenical council, which solemnly condemned the worship and use of images. Those who, notwithstanding this decree of the council, raised commotions in the state, were severely punished; and new laws were enacted, to set bounds to the violence of monastic rage. Leo IV. who was declared emperor in 775, pursued the same measures, and had recourse to the coercive influence of penal laws, in order to extirpate idolatry out of the Christian church. Irene, the wife of Leo, poisoned her husband in 780, assumed the reins of empire during the minority of her son Constantine, and in 786 summoned a council at Nice in Bithynia, known by the name of the *second Nicene council*, which abrogated the laws and decrees against the new idolatry, restored the worship of images and of the cross, and denounced severe punishments against those who maintained that God was the only object of religious

adoration. In this contest, the Britons, Germans, and Gauls, were of opinion, that images might be lawfully continued in churches, but they considered the worship of them as highly injurious and offensive to the Supreme Being. Charlemagne distinguished himself as a mediator in this controversy: he ordered four books concerning images to be composed, refuting the reasons urged by the Nicene bishops to justify the worship of images, which he sent to Adrian the Roman pontiff in 790, in order to engage him to withdraw his approbation of the decrees of the last council of Nice. Adrian wrote an answer; and in 794 a council of 300 bishops, assembled by Charlemagne at Francfort on the Maine, confirmed the opinion contained in the four books, and solemnly condemned the worship of images. In the Greek church, after the banishment of Irene, the controversy concerning images broke out anew, and was carried on by the contending parties, during the half of the ninth century, with various and uncertain success. The emperor Nicephorus appears upon the whole to have been an enemy to this idolatrous worship. His successor, Michael Curopalates, surnamed *Rhangabe*, patronized and encouraged it. But the scene changed on the accession of Leo the Armenian to the empire; who assembled a council at Constantinople in 814, that abolished the decrees of the Nicene council. His successor Michael, surnamed *Balbus*, disapproved the worship of images, and his son Theophilus treated them with great severity. However, the empress Theodora, after his death, and during the minority of her son, assembled a council at Constantinople in 842, which reinstated the decrees of the second Nicene council, and encouraged image worship by a law. The council held at the same place under Photius, in 879, and reckoned by the Greeks the eighth general council, confirmed and renewed the Nicene decrees. In commemoration of this council, a festival was instituted by the superstitious Greeks, called the *feast of orthodoxy*. The Latins were generally of opinion, that images might be suffered as the means of a living memory of the faithful, and of calling to their remembrance the pious exploits and virtuous actions of the persons whom they represented; but they detested all thoughts of paying them the least marks of religious homage or adoration. The council of Paris, assembled in 824 by Louis the Meek, resolved to allow the use of images in the churches, but severely prohibited rendering them religious worship. Nevertheless, towards the conclusion of this century, the Gallican clergy began to pay a kind of religious homage to the images of saints, and their example was followed by the Germans and other nations. However, the iconoclasts still had their adherents among the Latins; the most eminent of whom was Claudius bishop of Turin, who in 823 ordered all images, and even the cross, to be cast out of the churches, and committed to the flames; and he wrote a treatise, in which he declared both against the use and worship of them. He condemned relics, pilgrimages to the holy land, and all voyages to the tombs of saints; and to his writings and labours it was owing, that the city of Turin, and the adjacent country, was, for a long time after his death, much less infected with superstition than the other parts of Europe. The controversy concerning the sanctity of images was again revived by Leo bishop of Chalcedon, in the 11th century, on occasion of the emperor Alexius's converting the figures of silver that adorned the portals of the churches into money, in order to supply the exigencies of the state. The bishop obstinately maintained that he had been guilty of sacrilege; and published a treatise, in which he affirmed, that in these images there resided an inherent sanctity, and that the adoration of Christians ought not to be confined to the persons represented by these images, but extended to the images themselves. The emperor assembled a council at Constantinople, which determined, that the images of Christ and of the Saints were to be honoured only with a relative

worship; and that invocation and worship were to be addressed to the Saints only as the servants of Christ, and on account of their relation to him as their master. Leo, dissatisfied even with these absurd and superstitious decisions, was sent into banishment. In the western church, the worship of images was disapproved and opposed by several considerable parties, as the Petrobrusians, Albigenses, Waldenses, &c. till at length this idolatrous practice was entirely abolished in many parts of the Christian world by the Reformation. See IMAGE.

ICONOGRAPHIA, from *εικων* "image," and *γραφω* "I describe," the description of images or ancient statues of marble and copper; also of busts and semi-busts, penates, paintings in fresco, mosaic works, and ancient pieces of miniature.

ICONOLATRÆ, or ICONOLATERS (from *εικων*, and *λατρεω* "I worship,") or ICONODULI (from *εικων* and *δουλω* "I serve,") those who worship images: a name which the iconoclasts give to those of the Romish communion, on account of their adoring images, and of rendering to them the worship only due to God. See ICONOCLASTS and IMAGE.

ICOSAHEDRON, in geometry, a regular solid, consisting of 20 triangular pyramids, whose vertices meet in the centre of a sphere supposed to circumscribe it; and therefore have their height and bases equal: wherefore the solidity of one of these pyramids multiplied by 20, the number of bases, gives the solid contents of the icosaedron.

ICOSANDRIA, from *εικοσι* "twenty," and *ανθρωπος* "a man or husband," the name of the 12th class in Linnæus's sexual method, consisting of plants with hermaphrodite flowers, which are furnished with 20 or more stamina, that are inserted into the inner side of the calyx or petals. See BOTANY, p. 41.

ICTINUS, a celebrated Greek architect who lived about 430 B. C. built several magnificent temples, and among others that of Minerva at Athens.

IDA, in ancient geography, a mountain situated in the heart of Crete where broadest; the highest of all in the island; round, and in compass 60 stadia (Strabo); the nursing place of Jupiter, and where his tomb was visited in Varro's time. Another *Ida*, a mountain of Mysia, or rather a chain of mountains (Homer, Virgil), extending from Zeleia on the south of the territory of Cyzicus to Lectum the utmost promontory of Troas. The abundance of its waters became the source of many rivers, and particularly of the Simois, Scamander, Ætæops, Granicus, &c. It was covered with green wood, and the elevation of its top opened a fine extensive view of the Hellespont and the adjacent countries; for which reason it was frequented by the gods during the Trojan war, according to Homer. The top was called *Gargara* (Homer, Strabo); and celebrated by the poets for the judgment of Paris on the beauty of the three goddesses, Minerva, Juno, and Venus, to the last of whom he gave the preference.

IDALIUM, in ancient geography, a promontory on the east side of Cyprus. Now *Capo di Griego*; with a high rugged eminence rising over it, in the form of a table. It was sacred to Venus; and hence the epithet *Idalia* given her by the poets. The eminence was covered with a grove: and in the grove was a little town, in Pliny's time extinct. *Idalia*, according to Bochart, denotes the place or spot sacred to the goddess.

IDEA, the reflex perception of objects, after the original perception or impression has been felt by the mind. See METAPHYSICS, and LOGIC.

IDENTITY, denotes that by which a thing is itself, and not any thing else; in which sense *identity* differs from *similitude*, as well as *diversity*. See METAPHYSICS.

IDES, in the ancient Roman kalendar, were eight days in each month; the first of which fell on the 15th of March, May, July, and October; and on the 13th day of the other months. The origin of the word is contested. Some will have

it formed from *ιδειν* "to see;" by reason the full moon was commonly seen on the days of the ides: others from *ειδος* "species, figure," on account of the image of the full moon then visible: others from *idulium*, or *ovis idulis*, a name given by the Hetrurians to a victim offered on that day to Jupiter: others from the Hetrurian word *iduo*, i. e. *divido*; by reason the ides divided the moon into two nearly equal parts.

The ides came between the KALENDS and the NONES; and were reckoned backwards. Thus they called the 14th day of March, May, July, and October, and the 12th of the other months, the *pridie idus*, or the day before the ides; the next preceding day they called the *tertia idus*; and so on, reckoning always backwards till they came to the NONES. This method of reckoning time is still retained in the chancery of Rome, and in the kalendar of the Breviary. The ides of May were consecrated to Mercury: the ides of March were ever esteemed unhappy, after Cæsar's murder on that day: the time after the ides of June was reckoned fortunate for those who entered into matrimony: the ides of August were consecrated to Diana, and were observed as a feast-day by the slaves. On the ides of September, auguries were taken for appointing the magistrates, who formerly entered into their offices on the ides of May, afterwards on those of March.

IDIOCY, a defect of understanding. Both idiocy and LUNACY excuse from the guilt of crimes: (see CRIME.) For the rule of law as to lunatics, which also may be easily adapted to idiots, is, that *furiosus furor solum punitur*. In criminal cases, therefore, (says Judge Blackstone,) idiots and lunatics are not chargeable for their own acts, if committed when under these incapacities: no, not even for treason itself. Also, if a man in his sound memory commits a capital offence, and before arraignment for it he becomes mad, he ought not to be arraigned for it: because he is not able to plead to it with that advice and caution that he ought. And if, after he has pleaded, the prisoner becomes mad, he shall not be tried: for how can he make his defence? If, after he be tried and found guilty, he loses his senses before judgment, judgment shall not be pronounced; and if, after judgment, he becomes of nonsane memory, execution shall be stayed; for, peradventure, says the humanity of the English law, had the prisoner been of sound memory, he might have alleged something in stay of judgment or execution. Indeed, in the bloody reign of Henry VIII. a statute was made, which enacted, that if a person, being *compos mentis*, should commit high treason, and after fall into madness, he might be tried in his absence, and should suffer death, as if he were of perfect memory. But this savage and inhuman law was repealed by the statute 1 & 2 Ph. & M. c. 17. For, as is observed by Sir Edward Coke, "the execution of an offender is for example, *ut poena ad paucos, metus ad omnes perveniat*: but so it is not when a madman is executed; but should be a miserable spectacle, both against law, and of extreme inhumanity and cruelty, and can be no example to others." But if there be any doubt whether the party be *compos* or not, this shall be tried by a jury. And if he be so found, a total idiocy, or absolute insanity, excuses from the guilt, and of course from the punishment, of any criminal action committed under such deprivation of the senses: but if a lunatic hath lucid intervals of understanding, he shall answer for what he does in those intervals as if he had no deficiency. Yet, in the case of absolute madmen, as they are not answerable for their actions, they should not be permitted the liberty of acting unless under proper control; and, in particular, they ought not to be suffered to go loose, to the terror of the king's subjects. It was the doctrine of our ancient law, that persons deprived of their reason might be confined till they recovered their senses, without waiting for the forms of a commission or other special authority from the crown: and now, by the

vagrant acts, a method is chalked out for imprisoning, chaining, and sending them to their proper homes.

The matrimonial contract likewise cannot take place in a state of idiocy. It was formerly adjudged, that the issue of an idiot was legitimate, and his marriage valid. A strange determination! since consent is absolutely requisite to matrimony, and neither idiots nor lunatics are capable of consenting to any thing. And therefore the civil law judged much more sensibly when it made such deprivations of reason a previous impediment, though not a cause of divorce if they happened after marriage. And modern resolutions have adhered to the sense of the civil law, by determining that the marriage of a lunatic, not being in a lucid interval, was absolutely void. But as it might be difficult to prove the exact state of the party's mind at the actual celebration of the nuptials, upon this account (concurring with some private family reasons—for which see Private Acts 23 Geo. II. c. 6.) the statute 15 Geo. II. c. 30. has provided that the marriage of lunatics and persons under phrenesies (if found lunatics under a commission, or committed to the care of trustees under any act of parliament), before they are declared of sound mind by the lord chancellor, or the majority of such trustees, shall be totally void.

Idiots and persons of nonsane memory, as well as infants and persons under duress, are not totally disabled either to convey or purchase, but *sub modo* only. For their conveyances and purchases are voidable, but not actually void. The king, indeed, on behalf of an idiot, may avoid his grants or other acts. But it hath been said, that a *non compos* himself, though he be afterwards brought to a right mind, shall not be permitted to allege his own insanity in order to avoid such grant: for that no man shall be allowed to stupefy himself, or plead his own disability. The progress of this notion is somewhat curious. In the time of Edward I. *non compos* was a sufficient plea to avoid a man's own bond: and there is a writ in the register for the alienor himself to recover lands aliened by him during his insanity, *dum fuit non compos mentis sue, ut dicit, &c.* But under Edward III. a scruple began to arise, whether a man should be permitted to *blemish* himself, by pleading his own insanity: and, afterwards, a defendant in assize having pleaded a release by the plaintiff since the last continuance, to which the plaintiff replied (*ore tenus*, as the manner then was) that he was out of his mind when he gave it, the court adjourned the assize; doubting whether, as the plaintiff was sane both then and at the commencement of the suit, he should be permitted to plead an intermediate deprivation of reason; and the question was asked, how he came to remember the release, if out of his senses when he gave it? Under Henry VI. this way of reasoning (that a man shall not be allowed to disable himself by pleading his own incapacity, because he cannot know what he did under such a situation) was seriously adopted by the judges in argument, upon a question, whether the heir was barred of his right of entry by the feoffment of his insane ancestor? And from these loose authorities, which Fitzherbert does not scruple to reject as being contrary to reason, the maxim, that a man shall not stultify himself, hath been handed down as settled law: though later opinions, feeling the inconvenience of the rule, have in many points endeavoured to restrain it. And, clearly, the next heir, or other person interested, may, after the death of the idiot or *non compos*, take advantage of his incapacity and avoid the grant. And so too, if he purchases under this disability, and does not afterwards, upon recovering his senses, agree to the purchase, his heir may either waive or accept the estate at his option. In like manner an infant may waive such purchase or conveyance, when he comes to full age; or, if he does not then actually agree to it, his heirs may waive it after him. Persons also, who purchase or convey under duress, may affirm or avoid such transaction, whenever the duress is

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ceased. For all these are under the protection of the law; which will not suffer them to be imposed upon through the imbecility of their present condition; so that their acts are only binding in case they be afterwards agreed to when such imbecility ceases. Yet the guardians or committees of a lunatic, by the statute 11 Geo. III. c. 20. are empowered to renew in his right, under the directions of the court of chancery, any lease for lives or years, and apply the profits of such renewal for the benefit of such lunatic, his heirs or executors. See LUNACY.

IDIOM, among grammarians, properly signifies the peculiar genius of each language, but is often used in a synonymous sense with dialect. The word is Greek, *ιδιωμα* "propriety," formed of *ιδιος* "proper, own."

IDIOPATHY, in physic, a disorder peculiar to a certain part of the body, and not arising from any preceding disease; in which sense it is opposed to sympathy. Thus, an epilepsy is idiopathic when it happens merely through some fault in the brain, and sympathetic when it is the consequence of some other disorder.

IDIOSYNCRASY, among physicians, denotes a peculiar temperament of body, whereby it is rendered more liable to certain disorders than persons of a different constitution usually are.

IDIOT, or IDEOT, in our laws, denotes a natural fool, or a fool from his birth. See IDIOCY. The word is originally Greek, *ιδιωτης*, which primarily imports a *private person*, or one who leads a private life, without any share or concern in the government of affairs. A person who has understanding enough to measure a yard of cloth, number twenty rightly, and tell the days of the week, &c. is not an idiot in the eye of the law: but a man who is born deaf, dumb, and blind, is considered by the law in the same state as an idiot.

IDIOR is also used, by ancient writers, for a person ignorant or unlearned; answering to *illiteratus* or *imperitus*. In this sense, Victor tells us, in his Chronicon, that in the consulship of Messala, the Holy Gospels, by command of the emperor Anastasius, were corrected and amended, as having been written by idiot evangelists: *tanquam ab idiotis evangelistis composita*.

IDLENESS, a reluctance in people to be employed in any kind of work. Idleness in any person whatsoever is a high offence against the public economy. In China it is a maxim, that if there be a man who does not work, or a woman that is idle, in the empire, somebody must suffer cold or hunger: the produce of the lands not being more than sufficient, with culture, to maintain the inhabitants; and therefore, though the idle person may shift off the want from himself, yet it must in the end fall somewhere. The court also of A reopagus at Athens punished idleness, and exerted a right of examining every citizen in what manner he spent his time; the intention of which was, that the Athenians, knowing they were to give an account of their occupations, should follow only such as were laudable, and that there might be no room left for such as lived by unlawful arts. The civil law expelled all sturdy vagrants from the city: and, in our own law, all idle persons or vagabonds, whom our ancient statutes describe to be "such as wake on the night, and sleep on the day, and haunt customable taverns and ale-houses, and routs about; and no man wot from whence they come, ne whether they go;" or such as are more particularly described by statute 17 Geo. II. c. 5. and divided into three classes, *idle* and *disorderly* persons, *rogues* and *vagabonds*, and *incorrigible rogues*;—all these are offenders against the good order, and blemishes in the government, of any kingdom. They are therefore all punished, by the statute last mentioned; that is to say, idle and disorderly persons with one month's imprisonment in the house of correction; rogues and vagabonds with whipping,

and imprisonment not exceeding six months; and incorrigible rogues with the like discipline, and confinement not exceeding two years: the breach and escape from which confinement in one of an inferior class ranks him among incorrigible rogues; and in a rogue (before incorrigible) makes him a felon, and liable to be transported for seven years. Persons harbouring vagrants are liable to a fine of forty shillings, and to pay all expences brought upon the parish thereby; in the same manner as, by our ancient laws, whoever harboured any stranger for more than two nights, was answerable to the public for any offence that such his inmate might commit.

IDOL, in pagan theology, an image or fancied representation of any of the heathen gods. This image, of whatever materials it consisted, was, by certain ceremonies called *consecration*, converted into a god. While under the artificer's hands, it was only a mere statue. Three things were necessary to turn it into a god; proper ornaments, consecration, and oration. The ornaments were various, and wholly designed to blind the eyes of the ignorant and stupid multitude, who are chiefly taken with show and pageantry. Then followed the consecration and oration, which were performed with great solemnity among the Romans. See **IMAGE**.

IDOLATRY, or the worship of idols, may be distinguished into two sorts. By the first, men adore the works of God, the sun, the moon, the stars, angels, dæmons, men, and animals: by the second, men worship the work of their own hands, as statues, pictures, and the like: and to these may be added a third, that by which men have worshipped the true God under sensible figures and representations. This indeed may have been the case with respect to each of the above kinds of idolatry; and thus the Israelites adored God under the figure of a calf.

The stars were the first objects of idolatrous worship, on account of their beauty, their influence on the productions of the earth, and the regularity of their motions, particularly the sun and moon, which are considered as the most glorious and resplendent images of the Deity: afterwards, as their sentiments became more corrupted, they began to form images, and to entertain the opinion, that, by virtue of consecration, the gods were called down to inhabit or dwell in their statues. Hence Arnobius takes occasion to rally the pagans for guarding so carefully the statues of their gods, who, if they were really present in their images, might save their worshippers the trouble of securing them from thieves and robbers.

As to the adoration which the ancient pagans paid to the statues of their gods, it is certain, that the wiser and more sensible heathens considered them only as simple representations or figures designed to recall to their minds the memory of their gods. This was the opinion of Varro and Seneca: and the same sentiment is clearly laid down in Plato, who maintains, that images are inanimate, and that all the honour paid to them has respect to the gods whom they represent. But as to the vulgar, they were stupid enough to believe the statues themselves to be gods, and to pay divine worship to stocks and stones.

Soon after the flood, idolatry seems to have been the prevailing religion of all the world; for, wherever we cast our eyes at the time of Abraham, we scarcely see any thing but false worship and idolatry. And it appears from Scripture, that Abraham's forefathers, and even Abraham himself, were for a time idolaters. The Hebrews were indeed expressly forbidden to make any representation of God; they were not so much as to look upon an idol: and from the time of the Maccabees to the destruction of Jerusalem, the Jews extended this precept to the making the figure of any man: by the law of Moses, they were obliged to destroy all the images they found, and were forbidden to apply any of the gold or silver to their own use, that no one might receive the least profit from any thing belonging to an idol. Of this the Jews, after they had smarted for their idola-

try, were so sensible, that they thought it unlawful to use any vessel that had been employed in sacrificing to a false god, to warm themselves with the wood of a grove after it was cut down, or to shelter themselves under its shade.

But the preaching of the Christian religion, wherever it prevailed, entirely rooted out idolatry; as did also that of Mahomet, which is built on the worship of one God. It must not, however, be forgotten, that the Protestant Christians charge those of the church of Rome with paying an idolatrous kind of worship to the pictures or images of saints and martyrs: before these, they burn lamps and wax-candles; before these, they burn incense, and, kneeling, offer up their vows and petitions: they, like the Pagans, believe that the saint to whom the image is dedicated, presides in a particular manner about its shrine, and works miracles by the intervention of its image; and that, if the image was destroyed or taken away, the saint would no longer perform any miracle in that place.

IDOMENEUS, in fabulous history, succeeded his father Deucalion on the throne of Crete. He accompanied the Greeks to the Trojan war with a fleet of 90 ships. During this celebrated war he rendered himself famous by his valour, and slaughtered many of the enemy. At his return from the Trojan war, he made a vow to Neptune in a dangerous tempest, that if he escaped from the fury of the seas and storms, he would offer to the god whatever living creature first presented itself to his eye on the Cretan shore. This was no other than his son, who came to congratulate his father upon his safe return. Idomeneus performed his promise to the god; and the inhumanity and rashness of this sacrifice rendered him so odious in the eyes of his subjects, that he left Crete, and migrated in quest of a settlement. He came to Italy, and founded a city on the coast of Calabria, which he called *Salentum*. He died in an extreme old age, after he had had the satisfaction of seeing his new kingdom flourish, and his subjects happy. According to the Greek scholiast of Lycophron, v. 1217, Idomeneus, during his absence in the Trojan war, entrusted the management of his kingdom to Leucos, to whom he promised his daughter Clisithere in marriage at his return. Leucos at first governed with moderation; but he was persuaded by Nauplius king of Eubœa to put to death Meda the wife of his master, with her daughter Clisithere, and to seize the kingdom. After these violent measures he strengthened himself on the throne of Crete, and Idomeneus at his return found it impossible to expel the usurper.

IDUMÆA. See **EDOM**.

JEALOUSY, in ethics, is that peculiar uneasiness which arises from the fear that some rival may rob us of the affection of one whom we greatly love, or suspicion that he has already done it. The first sort of jealousy is inseparable from love before it is in possession of its object: the latter is often unjust, generally mischievous, always troublesome.

IDYLLION, in ancient poetry, is only a diminutive of the word **EIDOS**, and properly signifies any poem of moderate extent, without considering the subject. But as the collection of Theocritus's poems were called *idyllia*, and the pastoral pieces being by far the best in that collection, the term *idyllion* seems to be now appropriated to pastoral pieces.

JEARS or **GEERS**, in the sea-language, an assemblage of tackles, by which the lower yards of a ship are hoisted along the mast to their usual station, or lowered from thence as occasion requires; the former of which operations is called *swaying*, and the latter *striking*.

JEBUSÆI, one of the seven ancient people of Canaan, descendants of Jebusi, Canaan's son; so warlike and brave as to have stood their ground, especially in Jebus, afterwards called *Jerusalem*, down to the time of David. Judges i. 21. 1 Sam. v. 6.

JEDBURGH, a considerable borough of Roxburghshire, situated almost in the centre of the county, on the banks of the Jed, and near its confluence with the Teviot. It has a good market for corn and cattle, and is the seat of the courts of justice for the county. It is 36 miles S. E. of Edinburgh. W. lon. 2. 25. N. lat. 55. 35.

JEDDO, the capital of the empire of Japan. It is situated in Nippon, the largest of the Japanese islands: it is open on all sides, having neither walls nor ramparts; and the houses are built of earth, and boarded on the outside, to prevent the rain from destroying the walls. In every street is an iron gate, which is shut up in the night, and a kind of custom-house, or magazine, for merchandize. It is nine miles in length and six in breadth, and contains 1,000,000 inhabitants. A fire happened in 1658, which in the space of 48 hours burnt down 100,000 houses, in which a vast number of inhabitants perished, and the emperor's palace was reduced to ashes; but the whole is rebuilt. The imperial palace is in the middle of the town, and is defended by walls, ditches, towers, and bastions. Where the emperor resides are three towers, nine stories high, each covered with plates of gold; and the hall of audience is supported by pillars of massy gold. Near the palace are several others, where the relations of the emperor live. The empress has a palace of her own, and there are 20 small ones for the concubines. Besides, all the vassal kings have each a palace in the city, with a handsome garden, and stables for 2000 horses. The houses of the common sort are nothing but a ground-floor, the rooms parted by folding screens; so that they can be made larger or smaller at pleasure. Jeddo is seated in a plain, at the bottom of a fine bay; and the river which crosses it is divided into several canals. E. lon. 139. 30. N. lat. 36. 10.

JEFFERY. See **GEOFFREY**.

JEFFREYS (**SIR GEORGE**), baron Wem, commonly called *Judge Jeffreys*, was the sixth son of John Jeffreys, Esq. of Acton in Denbighshire; and was educated at Westminster-school, whence he removed to the Inner Temple, where he applied himself to the study of the law. Alderman Jeffreys, who was probably related to him, introduced him among the citizens of London; and he being a merry bottle-companion, soon came into great business, and was chosen their recorder. He was afterwards chosen solicitor to the duke of York; and in 1680 was knighted, and made chief-justice of Chester. At length, resigning the recordership, he obtained the post of chief-justice of the king's bench, and, soon after the accession of James II. the great seal. During the reign of king Charles II. he showed himself a bitter enemy to those dissenting ministers who, in that time of persecution, were tried by him: he was one of the greatest advisers and promoters of all the oppressions and arbitrary measures carried on in the reign of James II.; and his sanguinary and inhuman proceedings against Monmouth's unhappy adherents in the west, will ever render his name infamous. Whenever the prisoner was of a different party, or he could please the court by condemning him, instead of appearing, according to the duty of his office, as his counsel, he would scarcely allow him to speak for himself; but would load him with the grossest and most vulgar abuse; browbeat, insult, and turn to ridicule the witnesses that spoke in his behalf; and even threaten the jury with fines and imprisonment, if they made the least hesitation about bringing in the prisoner guilty. Yet it is said, that when he was in temper, and matters perfectly indifferent came before him, no one became a seat of justice better. Nay, it even appears, that, when he was under no state-influence, he was sometimes inclined to protect the natural and civil rights of mankind, of which the following instance has been given:—The mayor and aldermen of Bristol had been used to transport convicted criminals to the American

plantations, and sell them by way of trade. This turning to good account, when any pilferers or petty rogues were brought before them, they threatened them with hanging; and then some officers who attended earnestly persuaded the ignorant intimidated creatures to beg for transportation, as the only way to save them; and in general their advice was followed. Then, without more form, each alderman in course took one, and sold him for his own benefit; and sometimes warm disputes arose between them about the next turn. This infamous trade, which had been carried on many years, coming to the knowledge of the lord chief-justice, he made the mayor descend from the bench, and stand at the bar in his scarlet and fur, with his guilty brethren the aldermen, and plead as common criminals. He then obliged them to give securities to answer informations; but the proceedings were stopped by the Revolution.—However, the brutality Jeffreys commonly showed on the bench, where his voice and visage were equally terrible, at length exposed him to a severe mortification. A scrivener of Wapping having a cause before him, one of the opponent's counsel said he was a strange fellow, and sometimes went to church, and sometimes to conventicles; and it was thought he was a trimmer. At this the chancellor fired; A trimmer? (said he); I have heard much of that monster, but never saw one. Come forth, Mr. Trimmer, and let me see your shape." He then treated the poor fellow so roughly, that, on his leaving the hall, he declared he would not undergo the terrors of that man's face again to save his life, and he should certainly retain the frightful impressions of it as long as he lived. Soon after, the prince of Orange coming, the lord chancellor, dreading the public resentment, disguised himself in a seaman's dress, in order to leave the kingdom; and was drinking in a cellar, when this scrivener coming into the cellar, and seeing again the face which had filled him with such horror, started; on which Jeffreys, fearing he was known, feigned a cough, and turned to the wall with his pot of beer in his hand. But Mr. Trimmer going out, gave notice that he was there; and the mob rushing in, seized him, and carried him before the lord mayor, who sent him with a strong guard to the lords of the council, by whom he was committed to the Tower, where he died in 1689.—It is remarkable that the late countess of Pomfret met with very rude insults from the populace on the western road, only because she was grand daughter of the inhuman Jeffreys.

JEHOVAH, one of the scripture names of God, signifying the Being who is self-existent and gives existence to others. So great a veneration had the Jews for this name, that they left off the custom of pronouncing it, whereby its true pronunciation was forgotten. They call it *tetragrammaton*, or "the name with four letters;" and believe, that whoever knows the true pronunciation of it cannot fail to be heard by God.

JEHUD, or **Joud**, mountains in the N. W. part of Hindoostan Proper, extending from Attock eastward to Bember. They are part of the territory of the mountaineers, called Gickers, Gehkers, or Kakares. After Timur had passed the Indus, in 1398, the chiefs of these mountains came to make their submission to him; as Ambisares, the king of the same country, did to Alexander about 1730 years before.

JEJUNUM, the second of the small intestines; thus called from the Latin *jejunus*, "hungry;" because always found empty. See **ANATOMY**, p. 189.

JEKYL, a small island of N. America, at the mouth of the river Alatomaha, in Georgia.

JELLALÆAN, or **GELALÆAN Calendar**, *epocha*, and *year*. See **CALENDAR**, **EPOCHA**, and **YEAR**.

JELLY, a form of food, or medicine, prepared from the juices of ripe fruits boiled to a proper consistence with sugar, or the strong decoctions of the horns, bones, or extremities of animals, boiled to such a height as to be stiff and firm when

cold, without the addition of any sugar. The jellies of fruits are cooling, aponaceous, and acefcent, and therefore are good as medicines in all disorders of the primæ viæ, arising from alkalescent juices, especially when not given alone, but diluted with water. On the contrary, the jellies made from animal substances are all alkalescent, and are therefore good in all cases in which an acidity of the humours prevails: the alkalescent quality of these is, however, in a great measure taken off by the adding lemon juice and sugar to them. There were formerly a sort of jellies much in use, called *compound jellies*; these had the restorative medicinal drugs added to them, but they are now scarce ever heard of.

Oat JELLY, a preparation of common oats, recommended by many of the German physicians in all hectic disorders, to be taken with broth of snails or cray fish. It is made by boiling a large quantity of oats with the husk taken off, with some hartshorn shavings and currants together, with a leg of veal cut to pieces, and with the bones all broken; these are to be set over the fire with a large quantity of water, till the whole is reduced to a sort of jelly; which when strained and cold will be very firm and hard. A few spoonfuls of this are to be taken every morning, diluted with a basin of either of the above-mentioned broths, or any other warm liquor.

JEMPTERLAND, a province of Sweden, bounded on the north by Angermania, on the east by Medaipadia, on the south by Helſingia, and on the west by No way. It is full of mountains: and the principal towns are Reſſundt, Lich, and Docra.

JENA, or *GENO*, a town of Upper Hungary, 20 miles S. of Great Waradin, and 48 N. E. of Segedin. E. lon. 21. 5. N. lat. 46. 40.

JENCALORE a town of Asia, in Indoostan, and in the dominions of the Great Mogul, capital of a territory of the same name. It is seated on the river Chaul, in E. lon. 76. 25. N. lat. 30. 30.

JENISA, a river of the Russian empire, that runs from north to south through Siberia, and falls into the Frozen Ocean.

JENISKOL, a town of the Russian empire in Siberia, seated on the river Jenisa. It is large, populous, and pretty strong; and there are villages for several miles round it. It is subject to the Tungusians, who are pagans, and chiefly live on the above river. They pay a tribute to the emperor for every bow, reckoning a man and a woman for one. The climate is extremely cold; and no other fruits grow there but black and red currants, strawberries, and gooseberries. Corn, butchers meat, and wild fowls, are very cheap. E. lon. 86. 25. N. lat. 58. 40.

JENCOPING, a town of Sweden, in the province of Smaland, seated on the south side of the lake Werter, with a strong citadel. The houses are all built with wood. E. lon. 14. 20. N. lat. 57. 22.

JENKIN (ROBERT), a learned English divine in the 18th century, was bred at Cambridge, became master of St. John's college, and wrote several books much esteemed, viz. 1. An historical examination of the authority of General Councils, 4to. 2. The reasonableness and certainty of the Christian religion, 2 vols. 8vo. 3. *Defensio S. Augustini*. This book is written against M. Le Clerc. 4. Remarks on some books lately published, viz. Mr. Whiston's eight sermons, Locke's paraphrase, &c. 5. A translation from the French of the Life of Apollonius Tyaneus.

JENKINS (HENRY). See *LONGEVITY*.

JENKINS (Sir Leoline), a learned civilian and able statesman of the last century, born in Glamorganſhire about the year 1623. Being rendered obnoxious to the parliament during the civil war by adhering to the king's cause, he consulted his safety by flight; but returning on the restoration, he was admitted an advocate in the court of arches, and succeeded

Dr. Exton as judge. When the queen-mother Henrietta died in 1669 at Paris, her whole estate, real and personal, was claimed by her nephew Louis XIV: upon which Dr. Jenkins's opinion being called for and approved, he went to Paris, with three others joined with him in a commission, and recovered her effects; for which he received the honour of knighthood. He officiated as one of the mediators at the treaty of Nimeguen, in which tedious negotiation he was engaged about four years and a half; and was afterwards made a privy counsellor and secretary of state. He died in 1685; and, as he never married, bequeathed his whole estate to charitable uses: he was so great a benefactor to Jesus college, Oxford, that he is generally looked on as the second founder. All his letters and papers were collected and printed in 1724, in 2 vols. folio.

JENNY-WREN, a name given by writers on song-birds to the wren. See *WREN*.

JENTACULUM was, amongst the Romans, a morning refreshment like our breakfast. It was exceedingly simple, consisting, for the most part, of bread alone; labouring people indeed had something more substantial to enable them to support the fatigues of their employment. What has been here said may be observed of the Jews and Grecians also. The Greeks distinguished this morning-meal by the several names of *αριστον*, *αρχατισμος* or *αρχατισμα*, though *αριστον* is generally applied to dinner. See *EATING* and *DINNER*.

JEOFAILE, (compounded of three French words, *J'ay failli*, "I have failed,") a term in law, used for an oversight in pleading or other proceedings at law. The showing of these defects or oversights was formerly often practised by the counsel; and when the jury came into court in order to try the issue, they said, This inquest you ought not to take; and after verdict they would say to the court, To judgment you ought not to go. But several statutes have been made to avoid these delays occasioned by such suggestions; and a judgment is not to be stayed after verdict for mistaking the Christian or surname of either of the parties, or in a sum of money, or in the day, month, year, &c. where the same are rightly named in any preceding record.

JERBOA. See *Mus*.

JEREMIAH (the Prophecy of), a canonical book of the Old Testament. This divine writer was of the race of the priests, the son of Hilkia of Anathoth, of the tribe of Benjamin. He was called to the prophetic office when very young, about the 13th year of Josiah, and continued in the discharge of it about 40 years. He was not carried captive to Babylon with the other Jews, but remained in Judea to lament the desolation of his country. He was afterwards a prisoner in Egypt with his disciple Baruch, where it is supposed he died in a very advanced age. Some of the Christian fathers tell us he was stoned to death by their Jews, for preaching against their idolatry; and some say he was put to death by Pharaoh Hophra, because of his prophecy against him. Part of the prophecy of Jeremiah relates to the time after the captivity of Israel, and before that of Judah, from the first chapter to the 44th; and part of it was in the time of the latter captivity, from the 44th chapter to the end.

JERICHO, or *HIERICHUS*, in ancient geography, a city of Judea; situated between Jordan and Jerusalem, at the distance of 150 stadia from the latter, and 60 from the former. Josephus says, "the whole space from Jerusalem is desert and rocky, and equally barren and uncultivated from Jericho to the lake Asphaltites; yet the places near the town and above it are extremely fertile and delicious, so that it may be justly called a *divine plain*, surpassing the rest of the land of Canaan, no unfruitful country, and surrounded by hills in the manner of an amphitheatre. It produces opobalsamum myrobalsans, and dates; from the last of which it is called the *city of palm trees*,

by Moses. The place is now called *Raba*; and is situated, M. Volney informs us, "in a plain six or seven leagues long by three wide, around which are a number of barren mountains that render it extremely hot. Here formerly was cultivated the balm of Mecca. From the description of the Hadjes, this is a shrub similar to the pomegranate-tree, with leaves like those of rue: it bears a pulpy nut, in which is contained a kernel that yields the resinous juice we call *balm* or *balsam*. At present there is not a plant of it remaining at Raha; but another species is to be found there, called *Zakkoun*, which produces a sweet oil, also celebrated for healing wounds. This *zakkoun* resembles a plum-tree; it has thorns four inches long, with leaves like those of the olive-tree, but narrower and greener, and prickly at the end; its fruit is a kind of acorn, without a calyx, under the bark of which is a pulp, and then a nut, the kernel of which gives an oil that the Arabs sell very dear: this is the sole commerce of Raha, which is no more than a ruinous village.

JERIMOTH. See JARIMUTH.

JEROME (St.), in Latin *Hieronymus*, a famous doctor of the church, and the most learned of all the Latin fathers, was the son of Eusebius, and was born at Stridon, a city of the ancient Pannonia, about the year 340. He studied at Rome under Donatus, the learned grammarian. After having received baptism, he went into Gaul, and there transcribed St. Hilary's book *de Synodis*. He then went into Aquileia, where he contracted a friendship with Heliodorus, who prevailed on him to travel with him into Thrace, Pontus, Bithynia, Galatia, and Cappadocia. In 372 St. Jerome retired into a desert in Syria, where he was persecuted by the orthodox of Melittus's party for being a Sabellian, because he made use of the word *Hypostasis*, which had been used by the council of Rome in 369. This obliged him to go to Jerusalem; where he applied himself to the study of the Hebrew language, in order to receive a more perfect knowledge of the Holy Scriptures; and about this time he consented to be ordained, on condition that he should not be confined to any particular church. In 381 he went to Constantinople to hear St. Gregory of Nazianzen; and the following year returned to Rome, where he was made secretary to pope Damasus. He then instructed many Roman ladies in piety and the knowledge of the sciences, which exposed him to the calumnies of those whom he zealously reprov'd for their irregularities; and pope Siricius not having all the esteem for him which his learning and piety justly entitled him to, this learned doctor left Rome, and returned to the monastery of Bethlehem, where he employed himself in writing against those whom he called *heretics*, especially against Vigilantius and Jovinian. He had a quarrel with John of Jerusalem and Rufinus about the Origenists. He was the first who wrote against Pelagius; and died on the 30th of September 420, at about 80 years of age. There have been several editions of his works; the last, which is that of Verona, is in 11 vols. folio. His principal works are, 1. A Latin version of the Holy Scriptures, distinguished by the name of the *Vulgate*. 2. Commentaries on the Prophets, Ecclesiastes, St. Matthew's Gospel, and the Epistle to the Galatians, Ephesians, Titus, and Philemon. 3. Polemical treatises against Montanus, Helvidius, Jovinian, Vigilantius, and Pelagius. 4. Several letters. 5. A treatise on the lives and writings of the ecclesiastical authors who had flourished before his time. St. Jerome's style is lively and animated, and sometimes sublime.

JEROME of Prague, so called from the place of his birth, in Bohemia. He was neither a monk nor clergyman, but had a learned education. Having embraced the opinions of John Hus, he began to propagate them in the year 1480. In the mean time the council of Nice kept a watchful eye over him, and, considering him as a dangerous person, cited him to appear

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before them and give an account of his faith. In obedience to this citation, he went to Constance; but on his arrival in 1415, finding Hus in prison, he set out for his own country. Being seized however on the way, imprisoned and examined, he was so intimidated that he retracted, and pretended to approve of the condemnation of Wickliff's and Hus's opinions; but on the 26th of May 1416, he condemned that recantation in these terms: "I am not ashamed to confess here publicly my weakness. Yes, with horror I confess my base cowardice. It was only the dread of the punishment by fire which drew me to consent, against my conscience, to the condemnation of the doctrine of Wickliff and Hus." Accordingly sentence was passed on him; in pursuance of which he was delivered to the secular arm, and burnt, in 1416. He was a person of great parts, learning, and elocution.

JERONYMITES, or HIERONYMITES, a denomination given to divers orders or congregations of religious; otherwise called *Hermits of St. Jerome*.

JERSEY, an island in the English channel, 18 miles from the coast of Normandy in France, and 84 S. of Portland in Dorsetshire, subject to the English. It is about thirty miles in circumference, and difficult of access on account of the rocks, sands, and forts erected for its defence. It contains twelve parishes; and the chief town is St. Helier, in the south part of the island. It lies extremely well for trade in time of peace, and to annoy the French, by privateers, in time of war. It is well watered with rivulets, and is well stocked with fruit-trees. They have a noted manufacture for woollen stockings and caps, and are still governed by the ancient Norman laws. In 1781 a body of French troops landed on this island, surpris'd the lieutenant-governor, made him prisoner, and compelled him to sign a capitulation: but major Pierfon, the commander of the English troops, refused to abide by this forced capitulation, and attacked the French in the town of St. Helier. The French were compelled to surrender prisoners of war; but the gallant major was killed in the moment of victory. W. lon. 2. 10. N. lat. 49. 11.

NEW JERSEY, one of the United States of North America, bounded on the E. by Hudson's River and the Atlantic Ocean, on the S. by Delaware Bay, on the W. by Pennsylvania, and on the N. by a line drawn from the mouth of Mahakkamak River in lat. 41. 24. to a point in Hudson's River in lat. 41. It is 161 miles long and 52 broad. It is divided into 13 counties. Its produce is much the same as that of the neighbouring states. Trenton is the capital.

JERSEY, among woolcombers, denotes the finest wool, taken from the rest by dressing it with a Jersey comb.

JERUSALEM, an ancient and famous town of Asia, formerly capital of Judea, after David had conquered the Jebusites. It was taken by Nebuchadnezzar in the eleventh year of the reign of Zedekiah, and the Jews were led captives to Babylon. It was afterwards taken by the Romans, and ruined, together with the Temple, 70 years after the birth of Christ, being one of the most remarkable sieges in history. The emperor Adrian built a new city, near the ruins of ancient Jerusalem. It was taken by the Persians in 614, and by the Saracens in 636. In 1099 it was retaken by the Crusaders, who founded a new kingdom which lasted 88 years, under nine kings. Saladin king of Egypt and Syria got possession of it in 1187. The Turks drove away the Saracens in 1217, have kept possession of it ever since, and call it *Heteeds*, that is, The Holy City. It is now inhabited by Turks, Arabs, Jews, and Christians. It stands on a high rock, with steep ascents on every side except to the north. It is almost surrounded by valleys encompassed with mountains, so that it seems to stand in the middle of an amphitheatre. It is about three miles in circumference, and includes Mount Calvary, which was formerly without the walls. The

only thing that renders it considerable is the great resort of pilgrims; for the inhabitants accommodate them with lodgings and provisions, which is their chief business. A bashaw, with a guard of Janizaries, always resides here, to protect them from the insults of the Arabs. The church of the Holy Sepulchre, which the pilgrims come chiefly to visit, is a large structure, with a round nave, which has no light but what comes through the top, like the Pantheon at Rome. The dome is covered on the outside with lead, and within with cedar wood. The opening of the dome is closed with a net of wire, to hinder the birds from coming into the church. In the middle of the nave, and directly under the opening of the dome, is the Holy Sepulchre, which is placed in a chapel, whose door is three feet high and two broad. It is so small, that it will hold but three persons on their knees at a time. At the entrance, on the right hand, is the place where the body of our Saviour was laid. The table on which he was said to have been laid at first is two feet and a half high from the pavement, which is now covered with white marble, because the Christians who came to visit it were all for carrying away a small bit. This chapel is cut out of the rock, and there are three holes in the roof, to let out the smoke of the lamps, which are 44 in number, and always kept lighted. The whole is covered with white marble, both within and without; and on the outside there are 10 fine columns of the same. It is covered with a platform, the middle of which is exactly above the three holes, and forms a small dome, six feet in height, covered with lead, and supported by 12 columns of porphyry, placed by pairs on the platform, and so making six arches, having three lamps under each. Before the gate of the sepulchre is a silver lamp, so large that two men cannot fathom it. Every year, on Good Friday, all the parts of our Saviour's passion are solemnized and acted here. They have first a sermon, and then every one takes a lighted taper in his hand, with crucifixes, &c. to begin the procession. Among the crucifixes is one as large as life, being crowned with thorns, and besmeared with blood. They visit first the pillar of flagellation; next the prison; afterward the altar of the division of Christ's garments; then they advance to the chapel of derision, and thence to Mount Calvary, leaving their shoes at the bottom of the stairs. Here are two altars; one where our Lord was supposed to be nailed to the cross; and another where it was erected; and where they set up the crucified image, which finishes the ceremony: only they pull out the nails, take down the body, and wrap it in a winding-sheet. Jerusalem is 112 miles S. W. of Damascus, and 45 from the Mediterranean. E. lon. 35. 25. N. lat. 31. 55.

JESI, an ancient town of Italy, in the marquise of Ancona, with a bishop's see. It is seated on a mountain near the river Jesi, 17 miles S. W. of Ancona, and 112 N. E. of Rome. E. lon. 13. 16. N. lat. 43. 30.

JESSO, JENSO, or *Yedso*, a large island of Asia, to the N. of the island of Nippon, governed by a tributary prince dependent on the empire of Japan. It is full of woods, and the inhabitants are strong, robust, savage, and slovenly, when compared to the Japanese. They live by fishing and hunting, and are very little known to the Europeans.

JESSOP'S WELL, in Surry, in the parish of Stoke Daberon, a sulphureous spring, four miles S. W. of Epsom, something of the same kind as that of Harrowgate in Yorkshire.

JESSES, ribbons that hang down from garlands or crowns in falconry; also short straps of leather fastened to the hawk's legs, and so to vervels.

JESTING, or *concise wit*, as distinguished from continued wit or humour, lies either in the thought or the language, or both. In the first case, it does not depend upon any particular words or turn of the expression. But the greatest fund of jests lies in the language, *i. e.* in tropes or verbal figures; those af-

forded by tropes consist in the metaphorical sense of the words; and those of verbal figures principally turn upon a double sense of the same word, or a similitude of sound in different words. The third kind of jokes, which lie both in the sense and language, arise from figures of sentences, where the figure itself consists in the sense, but the wit turns upon the choice of the words.

JESUITS, or *the Society of Jesus*; a famous religious order of the Romish church, founded by Ignatius Loyola. See IGNATIUS. The plan which this fanatic formed of its constitution and laws was suggested, as he gave out, and as his followers still teach, by the immediate inspiration of heaven. But notwithstanding this high pretension, his design met at first with violent opposition. The pope, to whom Loyola had applied for the sanction of his authority to confirm the institution, referred his petition to a committee of cardinals. They represented the establishment to be unnecessary as well as dangerous, and Paul refused to grant his approbation of it. At last, Loyola removed all his scruples by an offer which it was impossible for any pope to resist. He proposed, that besides the three vows of poverty, of chastity, and of monastic obedience, which are common to all the orders of regulars, the members of his society should take a fourth vow of obedience to the pope, binding themselves to go whithersoever he should command for the service of religion, and without requiring any thing from the holy see for their support. At a time when the papal authority had received such a shock by the revolt of so many nations from the Romish church; at a time when every part of the popish system was attacked with so much violence and success, the acquisition of a body of men, thus peculiarly devoted to the see of Rome, and whom it might set in opposition to all its enemies, was an object of the highest consequence. Paul instantly perceiving this, confirmed the institution of the Jesuits by his bull, granted the most ample privileges to the members of the society, and appointed Loyola to be the first general of the order. The event hath fully justified Paul's discernment, in expecting such beneficial consequences to the see of Rome from this institution. In less than half a century, the society obtained establishments in every country that adhered to the Roman-catholic church: its power and wealth increased amazingly; the number of its members became great; their character as well as accomplishments were still greater; and the Jesuits were celebrated by the friends and dreaded by the enemies of the Romish faith, as the most able and enterprising order in the church.

The constitution and laws of the society were perfected by Laynez and Aquaviva, the two generals who succeeded Loyola, men far superior to their master in abilities and in the science of government. They framed that system of profound and artful policy which distinguishes the order. The large infusion of fanaticism mingled with its regulation should be imputed to Loyola its founder. Many circumstances concurred in giving a peculiarity of character to the order of Jesuits, and in forming the members of it not only to take greater part in the affairs of the world than any other body of monks, but to acquire superior influence in the conduct of them.

The primary object of almost all the monastic orders is to separate men from the world, and from any concern in its affairs. In the solitude and silence of the cloister, the monk is called to work out his own salvation by extraordinary acts of mortification and piety. He is dead to the world, and ought not to mingle in its transactions. He can be of no benefit to mankind but by his example and by his prayers. On the contrary, the Jesuits are taught to consider themselves as formed for action. They are chosen soldiers, bound to exert themselves continually in the service of God, and of the pope his vicar on earth. Whatever tends to instruct the ignorant, whatever can be of

use to reclaim or to oppose the enemies of the holy see, is their proper object. That they may have full leisure for this active service, they are totally exempted from those functions the performance of which is the chief business of other monks. They appear in no processions; they practise no rigorous austerities; they do not consume one half of their time in the repetition of tedious offices; but they are required to attend to all the transactions of the world, on account of the influence which these may have upon religion; they are directed to study the dispositions of persons in high rank, and to cultivate their friendship; and by the very constitution as well as genius of the order, a spirit of action and intrigue is infused into all its members.

As the object of the society of Jesuits differed from that of the other monastic orders, the diversity was no less in the form of its government. The other orders are to be considered as voluntary associations, in which whatever affects the whole body is regulated by the common suffrage of all its members. The executive power is vested in the persons placed at the head of each convent or of the whole society; the legislative authority resides in the community. Affairs of moment, relating to particular convents, are determined in conventual chapters; such as respect the whole order are considered in general congregations. But Loyola, full of the ideas of implicit obedience, which he had derived from his military profession, appointed that the government of his order should be purely monarchical. A general, chosen for life by deputies from the several provinces, possessed power that was supreme and independent, extending to every person and to every case. He, by his sole authority, nominated provincials, rectors, and every other officer employed in the government of the society, and could remove them at pleasure. In him was vested the sovereign administration of the revenues and funds of the order. Every member belonging to it was at his disposal; and by his uncontrollable mandate he could impose on them any task, or employ them in what service soever he pleased. To his commands they were required to yield not only outward obedience, but to resign up to him the inclinations of their own wills and the sentiments of their own understandings. They were to listen to his injunctions as if they had been uttered by Christ himself. Under his direction they were to be mere passive instruments, like clay in the hands of the potter, or like dead carcasses incapable of resistance. Such a singular form of policy could not fail to impress its character on all the members of the order, and to give a peculiar force to all its operations. There is not, in the annals of mankind, any example of such a perfect despotism exercised not over monks shut up in the cells of a convent, but over men dispersed among all the nations of the earth.

As the constitutions of the order vest in the general such absolute dominion over all its members, they carefully provide for his being perfectly informed with respect to the character and abilities of his subjects. Every novice who offers himself as a candidate for entering into the order, is obliged to manifest his conscience to the superior, or a person appointed by him; and is required to confess not only his sins and defects, but to discover the inclinations, the passions, and the bent of his soul. This manifestation must be renewed every six months. The society, not satisfied with penetrating in this manner into the innermost recesses of the heart, directs each member to observe the words and actions of the novices: they are constituted spies upon their conduct, and are bound to disclose every thing of importance concerning them to the superior. In order that this scrutiny into their character may be as complete as possible, a long noviciate must expire, during which they pass through the several gradations of rank in the society; and they must have attained the full age of thirty-three years before they can be admitted to take the final vows, by which they become professed members. By these various methods, the superiors, under whose

immediate inspection the novices are placed, acquire a thorough knowledge of their dispositions and talents. In order that the general, who is the soul that animates and moves the whole society, may have under his eye every thing necessary to inform or direct him, the provincials and heads of the several houses are obliged to transmit to him regular and frequent reports concerning the members under their inspection. In these they descend into minute details with respect to the character of each person, his abilities natural or acquired, his temper, his experience in affairs, and the particular department for which he is best fitted. These reports, when digested and arranged, are entered into registers kept on purpose, that the general may, at one comprehensive view, survey the state of the society in every corner of the earth; observe the qualifications and talents of its members; and thus choose, with perfect information, the instruments which his absolute power can employ in any service for which he thinks meet to destine them.

As it was the professed intention of the order of Jesuits to labour with unwearied zeal in promoting the salvation of men, this engaged them of course in many active functions. From their first institution, they considered the education of youth as their peculiar province; they aimed at being spiritual guides and confessors; they preached frequently in order to instruct the people; they set out as missionaries to convert unbelieving nations. The novelty of the institution, as well as the singularity of its objects, procured the order many admirers and patrons. The governors of the society had the address to avail themselves of every circumstance in its favour; and in a short time the number as well as influence of its members increased wonderfully. Before the expiration of the sixteenth century, the Jesuits had obtained the chief direction of the education of youth in every catholic country in Europe. They had become the confessors of almost all its monarchs; a function of no small importance in any reign, but, under a weak prince, superior even to that of minister. They were the spiritual guides of almost every person eminent for rank or power. They possessed the highest degree of confidence and interest with the papal court, as the most zealous and able champions for its authority. The advantages which an active and enterprising body of men might derive from all these circumstances are obvious. They formed the minds of men in their youth. They retained an ascendant over them in their advanced years. They possessed, at different periods, the direction of the most considerable courts in Europe. They mingled in all affairs. They took part in every intrigue and revolution. The general, by means of the extensive intelligence which he received, could regulate the operations of the order with the most perfect discernment; and, by means of his absolute power, could carry them on with the utmost vigour and effect.

Together with the power of the order, its wealth continued to increase. Various expedients were devised for eluding the obligation of the vow of poverty. The order acquired ample possessions in every catholic country; and by the number as well as magnificence of its public buildings, together with the value of its property, moveable or real, it vied with the most opulent of the monastic fraternities. Besides the sources of wealth common to all the regular clergy, the Jesuits possessed one which was peculiar to themselves. Under pretext of promoting the success of their missions, and of facilitating the support of their missionaries, they obtained a special licence from the court of Rome to trade with the nations which they laboured to convert. In consequence of this, they engaged in an extensive and lucrative commerce both in the East and West Indies. They opened warehouses in different parts of Europe, in which they vended their commodities. Not satisfied with trade alone, they imitated the example of other commercial societies, and aimed at obtaining settlements. They acquired

possession accordingly of a large and fertile province in the southern continent of America, and reigned as sovereigns over some hundred thousand subjects.

Unhappily for mankind, the vast influence which the order of Jesuits acquired by all these different means, has been often exerted with the most pernicious effect. Such was the tendency of that discipline observed by the society in forming its members, and such the fundamental maxims in its constitution, that every Jesuit was taught to regard the interest of the order as the capital object to which every consideration was to be sacrificed. This spirit of attachment to their order, the most ardent perhaps that ever influenced any body of men, is the characteristic principle of the Jesuits, and serves as a key to the genius of their policy as well as the peculiarities in their sentiments and conduct.

As it was for the honour and advantage of the society that its members should possess an ascendant over persons in high rank or of great power; the desire of acquiring and preserving such a direction of their conduct with greater facility, has led the Jesuits to propagate a system of relaxed and pliant morality, which accommodates itself to the passions of men, which justifies their vices, which tolerates their imperfections, which authorises almost every action that the most audacious or crafty politician would wish to perpetrate.

As the prosperity of the order was intimately connected with the preservation of the papal authority, the Jesuits, influenced by the same principle of attachment to the interests of their society, have been the most zealous patrons of those doctrines which tend to exalt ecclesiastical power on the ruins of civil government. They have attributed to the court of Rome a jurisdiction as extensive and absolute as was claimed by the most presumptuous pontiffs in the dark ages. They have contended for the entire independence of ecclesiastics on the civil magistrates. They have published such tenets concerning the duty of opposing princes who were enemies of the Catholic faith, as countenanced the most atrocious crimes, and tended to dissolve all the ties which connect subjects with their rulers.

As the order derived both reputation and authority from the zeal with which it stood forth in defence of the Romish church against the attacks of the reformers, its members, proud of this distinction, have considered it as their peculiar function to combat the opinions and to check the progress of the Protestants. They have made use of every art, and have employed every weapon against them. They have set themselves in opposition to every gentle or tolerating measure in their favour. They have incessantly stirred up against them all the rage of ecclesiastical and civil persecution.

Monks of other denominations have indeed ventured to teach the same pernicious doctrines, and have held opinions equally inconsistent with the order and happiness of civil society. But they, from reasons which are obvious, have either delivered such opinions with greater reserve, or have propagated them with less success. Whoever recollects the events which have happened in Europe during two centuries, will find that the Jesuits may justly be considered as responsible for most of the pernicious effects arising from that corrupt and dangerous casuistry, from those extravagant tenets concerning ecclesiastical power, and from that intolerant spirit, which have been the disgrace of the church of Rome throughout that period, and which have brought so many calamities upon civil society.

But, amidst many bad consequences flowing from the institution of this order, mankind, it must be acknowledged, have derived from it some considerable advantages. As the Jesuits made the education of youth one of their capital objects, and as their first attempts to establish colleges for the reception of students were violently opposed by the universities in different countries, it became necessary for them, as the most effectual

method of acquiring the public favour, to surpass their rivals in science and industry. This prompted them to cultivate the study of ancient literature with extraordinary ardour. This put them upon various methods for facilitating the instruction of youth; and, by the improvements which they made in it, they have contributed so much towards the progress of polite learning, that on this account they have merited well of society. Nor has the order of Jesuits been successful only in teaching the elements of literature; it has produced likewise eminent masters in many branches of science, and can alone boast of a greater number of ingenious authors than all the other religious fraternities taken together.

But it is in the New World that the Jesuits have exhibited the most wonderful display of their abilities, and have contributed most effectually to the benefit of the human species. The conquerors of that unfortunate quarter of the globe had nothing in view but to plunder, to enslave, and to exterminate its inhabitants. The Jesuits alone have made humanity and civilization the objects of their settling there. About the beginning of the last century, they obtained admission into the fertile province of Paraguay, which stretches across the southern continent of America, from the bottom of the mountains of Potosi to the confines of the Spanish and Portuguese settlements on the banks of the river de la Plata.

The pernicious effects, however, of the spirit and constitution of this order rendered it early obnoxious to some of the principal powers in Europe, and gradually brought on its downfall. The emperor Charles V. saw it expedient to check its progress in his dominions; it was expelled England, by proclamation 2 James I. in 1604; Venice, in 1606; Portugal, in 1759; France, in 1764; Spain and Sicily, in 1767; and totally suppressed and abolished by the late Pope Clement XIV. in 1773.

JESUITS BARK. Under the article BARK we have given a general account of this invaluable article of the *Materia Medica*, and of its effects in diseases. We shall here give a more precise enumeration of the species and botanical distinctions, as they are set forth by the latest writers on the subject, particularly Mr. Lambert, in a "Description of the Genus *Cinchona* and the various Species of Vegetables which supply the Peruvian and other Barks."

"1. *CINCHONA OFFICINALIS* (*Quinquina Condam. Aëtæ Gallic. 1738*), **PERUVIAN-BARK Tree.** The characters as follows. See 2d pl. 45. vol. 1.

"*Cal.* Perianthium monophyllum, superum, quinquefidum, minimum, persistens. *Cor.* monopetala, infundibuliformis; tubus cylindricus, longus; limbus patulus, quinquefidus, acutus.

"*Stam.* Filamenta quinque, minima; antheræ oblongæ, intra faucem corollæ. *Pist.* Germen subrotundum, inferum; stylus longitudine corollæ; stigma crassiusculum, oblongum, simplex. *Per.* Capsula subrotunda; calyce coronata, bilocularis, à basi versus apicem bifariam dehiscens. *Sem.* plurima, oblonga, compressa, marginata. *Observ.* Flos interdum demit quintam partem numeri in singulis partibus."

In Vol. XL. of the *Phil. Trans.* p. 81. No 446. there is an account of the Jesuits-bark tree of Peru by Mr. William Arrot. — M. de la Condamine afterwards gave a more particular and scientific account of this tree: since which, specimens of the fructification have been sent to Europe; and Dr. Pulteney has given an excellent figure in his inaugural dissertation *De Cortice Peruviano*, in 164, from which our figure is copied.

A preparation of this bark has been recommended by M. Lunel, who directs us to "boil six grains of salt or tartar with an ounce of bark in a pint of water; and, after filtering the decoction, another pint of water is to be boiled with the same quantity of salt and the remaining bark. In this way no bitterness remains; at the same time that the strength of the bark appears

to be completely exhausted, as alcohol only extracted two grains of resin from it."

2. *CINCHONA CARIBÆA seu JAMAICENSIS*. Of this bark Dr. Wright has given an accurate description with an elegant engraving in the Phil. Transf. vol. lxvii. p. 504, from which we shall extract the botanic characters so as to distinguish it from other species. See the plate last referred to, and pl. 24, where we have given a view of the plant from Mr. Lambert.

"*Fol.* ovata, integerrima, acuta, nervia, opposita. *Flor.* singulares, axillares. *Cal.* Perianthium monophyllum, quinquefidum, minimum, persistens, campanulatum, obsolete quinqueidentatum. *Cor.* monopetala, infundibuliformis; tubo cylindraceus, longissimus; limbus quinquepartitus, tubo æqualis; laciniis ovatis, oblongis, reflexis, quandoque pendulis. *Stam.* Filamenta quinque, filiformia, erecta e medio tubi, longitudine corollæ; antheræ longissimæ, obtusæ, erectæ supra basin exteriorum, affixæ in fauce corollæ. *Capf.* bipartibilis, in duas partes dissepimento parallelo, latere inferiore dehiscens. *Sem.* plurima, compressa, marginata, oblonga."

Dr. Wright at first found this tree of a small size; since which he discovered it 50 feet high, and of a proportional thickness. The bark from the larger trunk is very fibrous and woody; that from the limbs and roots, when dry, breaks short off, and powders easier than the Peruvian bark. The Jesuits bark of Jamaica is one of the most agreeable bitters; and, infused in wine or spirits with a little lemon-peel, makes a rich and elegant tincture. In the north side of Jamaica, where this bark is produced in the greatest perfection, it is held in high esteem, and answers every purpose of the Jesuits bark. It sits easy on the stomach, and never occasions vomiting or nausea, but checks them in remitting fevers, or where the stomach is weak or disordered.

3. *CINCHONA TRIFLORA*: "*Fol.* oppositis, ovatis, acutis, integerrimis, petiolatis; *Floribus* tribus, axillaribus." The leaves are like the *Cinchona Caribæa*, but larger. The flowers three in number from the axillæ of the leaves, and of a fine red colour. The laciniæ are reflected. The seed-vessels are larger than any of the other species we have yet seen.

Mr. Roberts discovered this bark-tree about the year 1781, but found it no where else than in that district of Jamaica called *Manchioncel*. It grows by the side of a small rapid river near the Bath, and is about 35 feet high, but not thick in proportion. Towards the bottom of the trunk the bark is rough and furrowed; but higher up it is smooth, and has much the appearance of the Peruvian bark. It is thinner, more fibrous, and redder, than either the Peruvian or the Jamaica bark already mentioned. When powdered, it is of a cinnamon colour, inclining more to red. The taste is musty, bitter, and astringent. It yields its qualities either infused in wine or spirits, but with some difficulty to cold infusion by water. Trials have been made with this bark in the cure of fevers, and in several with advantage. But few people could bear more than 20 grains; and even that quantity sometimes occasioned so distressing a sickness and nausea that its exhibition has been in general left off.

4. *CINCHONA FLORIBUNDA*. "*Panicula terminali, capsulis turbinatis lævibus, foliis ellipticis acuminatis.*" Swartz. Prod. 41. Vahl. in Act. Havn. 1. 23. Phil. Transf. vol. 74. p. 452—456. t. 19. This bark is externally smooth, thin, and very fibrous. Its taste is a most nauseous bitter, that lasts long in the mouth; its astringent quality is more than the Peruvian bark. It is violently emetic when fresh; but, on long keeping, it loses this quality in part only, as no more than 20 grains can be ventured on, and its repetition must take place at several hours distance. Intermitting and remitting fevers have been cured by this bark, after refusing the use of the Peruvian bark. But it is probable that in those cases the cure was effected more from its emetic powers than by its tonic virtues. At present,

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however, it has fallen into disuse, except perhaps in the islands where it grows, or where the Peruvian bark has either failed, or cannot easily be got. See pl. 24.

5. *CINCHONA MACROCARPA*. "*Cinchona foliis oblongis subtus pubescentibus.*" Lambert, p. 22.

6. *CINCHONA BRACHYCARPA*. "*Panicula terminali, capsulis obovatis costatis, foliis ellipticis obtusis.*" Vahl. in Act. Havn. 1. p. 24. Swartz. Prod. 42. Mill. Dict. Mart. See pl. 24. — Mr. John Lindsay, surgeon, Westmoreland, Jamaica, discovered this species about the year 1785. It grew on the side of a steep hill or eminence running from east to west, and the tree was only about eight or ten feet high. The leaves in a recent state are oval, shining, and rigid; the sprig dries with great difficulty, and turns to a rusty brown. The spike has many white flowers, similar in figure to those of the St. Lucia bark-tree. The seed-vessels are larger than those of the Peruvian. The seeds are small and scaly. The trunks of this small tree are much furrowed; the cuticle very thick; the bark farther up smooth and brown; that of the inside is of the colour of the Peruvian bark, but more fibrous. It has no aroma, and is less bitter, but more astringent, than the *cinchona officinalis*. Mr. Lindsay, who made trial of this bark in the cure of intermitting and remitting fevers, found that the stomach will bear 25 or 30 grains very well. He used it also in tincture and decoction, in various cases of dyspepsia, with advantage. On the whole, were this bark to be had in sufficient quantity, it promises to be an useful succedaneum to the Peruvian bark. See pl. 24.

7. *CINCHONA ANGUSTIFOLIA*: "*Angustifolia panicula terminali, capsulis oblongis pentagonis, foliis lineari-lanceolatis pubescentibus.*" Swartz. Prod. 42. Act. Holm. 1781. p. 117—123. t. 3. Vahl. in Act. Havn. 1. p. 25. See the plate.

8. *CINCHONA MONTANA*. This species, which is a native of Guadaloupe and Martinico, was first described by M. Mallet, in the *Journal de Physique* for March 1781, under the name of *Quinquina Pion*; and is said to have been employed by the author with the happiest effects in intermittent fevers, even after the Peruvian bark had failed. It has since been scientifically described, and a figure of it given, by M. Badiet, in the *Journal de Physique*, Feb. 1789, under the name of "*Cinchona Montana, foliis ovatis utrinque glabris, stipulis basi connato-vaginantibus, corymbo terminali, corollis glabris.*" It is described as a very beautiful tree, growing more than 40 feet high, and having a large regular head of branches with a thick foliage. The bark, when the epidermis is removed, is of a grey-brown colour, and its taste very bitter. It would seem to contain no resin, all its extract being soluble in water. It is however represented as a very quick and powerful febrifuge, as we have already noticed; at the same time that it possesses an emetic and cathartic property. To these possibly its effect on fever may be in part owing; though whether its evacuating qualities will admit of its ever becoming a good substitute for the officinalis, or whether it possesses any tonic power, remains yet to be determined.

9. *CINCHONA LINEATA*: "*Panicula terminali, foliis ovatis acuminatis glabris. Capsulis pentagonis.*" Vahl. in Act. Havn. 1. p. 22. t. 4. Mill. Dict. Mart. See pl. 24.

10. *CINCHONA SPINOSA*; thus described in the *Journal de Physique* for October 1790. "*Folii minimis subrotundis, pedunculis unifloris, corollis glabris quadrifidis tetrandris, seminibus submarginatis. Folia aliquando bina opposita, aliquando terna verticillata.*" It is a native of St. Domingo. The flowers are like those of the *Caribæa*, but smaller by a half. It is but a shrubby plant, not exceeding eight or ten feet in height. The leaves are small and very glabrous, and the branches terminated by a spine. The peculiar properties of this bark, or its comparative efficacy as a medicine, have not yet been ascertained.

11. An account of the new species of BARK of *Ticamez*, an Indian village in the province of Quito, situated in 46 deg. N. lat.

and near 80 deg. W. lon. is given by Mr. Brown. A view of the leaves of this plant is shewn in the plate. Vide Lambert's Description of the Genus Cinchona.

12. CINCHONA LONGIFLORA: "Pedunculis axillaribus unifloris, foliis lineari-lanceolatis glabris, corolla longissima." Lambert's Descrip.

In the *Manuel des Vegetaux* by M. de St. Germain, we find two species mentioned under the names of *Cinchona Antillana* and *Cinchona Herbacea*; but as no descriptions are added, we can say nothing concerning them.

A bark under the name of ANGUSTURA BARK has been introduced into practice as a substitute for the Peruvian bark. See London Medical Journal, vol. x. p. 154. This bark is of much the same colour and thickness as the canella aromatica, and powders very freely. It has a good deal of the aromatic taste joined to bitterness and astringency; and has been supposed a true species of cinchona, different from the blanca or white sort mentioned by Mr. William Arrot in Phil. Transf. vol. xl. n^o 446. Mr. Bruce, however, is said to have pronounced it to be the bark of the *Brucea antisynterica*; to which indeed the resemblance is very considerable in its effects.

The Angustura bark was supposed at first to be the production of a tree growing on the coast of Africa; but is now found to come from the Spanish Main. According to *Experiments and Observations on the Angustura Bark*, by Augustus Everard Brande, just published, it is said to excel the Peruvian bark in some of its properties, and in other diseases to have different qualities. It is a powerful bitter, joined with an aroma not more pungent than the cascarilla, having a portion of pure oil which approaches in its nature to camphor. It differs from the Peruvian bark, by possessing a narcotic principle; and seems more powerful than it both as a tonic and an antiseptic. Various experiments on the antiseptic power of different substances are related, in which the columbo seems the least efficacious, and the Angustura bark to claim the highest rank.

According to Mr. Brande this bark seems to have excelled the Peruvian in curing intermittents: Dr. Pearson, however, found that in these it was scarcely superior in any instance, and sometimes not equal; but in low fevers, and putrid fevers, it seemed more powerful. In the headach, attended with fever, but arising from the stomach, Mr. Brande found it useful; and serviceable also in dysentery and dyspepsia.

JESUS the Son of SIRACH, a native of Jerusalem, composed, about 200 B. C. the book of Ecclesiasticus, called by the Greeks *Παρακλησις*, "replenished with virtue;" who also quote it under the title of *The Wisdom of Solomon the Son of Sirach*. His grandson, who was also of the same name, and a native of Jerusalem, translated it from the Hebrew into Greek about 121 B. C. We have this Greek version, but the Hebrew text is lost.

JESUS CHRIST, the Son of God, and Saviour of mankind, descended from heaven, and took upon him the human nature in Judæa, towards the conclusion of the reign of Herod the Great, king of that country. The place of his birth was Bethlehem, a flourishing city of Judah; but the year in which he was born is not precisely ascertained. The most general opinion is, that it happened about the year of Rome 748 or 749, and about 18 months before the death of Herod. The history of Jesus Christ, and the means by which the truth of his religion was made manifest to the world, are amply detailed in the holy scriptures. See CHRISTIAN Religion.

JET, a black inflammable substance of the bituminous kind, harder than asphaltum, and susceptible of a good polish. It becomes electrical by rubbing, attracting light bodies like yellow amber. It swims on water, so that its specific gravity must be less than 100; notwithstanding which it has been frequently confounded with the *lapis obsidianus*, the specific gravity of which, according to Kirwan, is no less than 1744. It also

resembles cannel-coal extremely in its hardness, receiving a polish, not soiling the fingers, &c. so that it has also been confounded with this. The distinction, however, is easily made betwixt the two; for cannel-coal wants the electrical properties of jet, and is likewise so heavy as to sink in water; its specific gravity being no less than 1273; whereas that of jet, as has already been said, is less than 1000. M. Magellan is of opinion that jet is a true amber, differing from the yellow kind only in the mere circumstance of colour, and being lighter on account of the greater quantity of bituminous matter which enters into its composition. When burning, it emits a bituminous smell. It is never found in strata or continued masses like fossil stones; but always in separate and unconnected heaps like the true amber. Great quantities of it have been dug up in the Pyrenean mountains; also near *Batalba*, a small town of Portugal; and in Galicia in Spain. It is found also in Ireland, Sweden, Prussia, Germany and Italy. It is used in making small boxes, buttons, bracelets, mourning-jewels, &c. Sometimes also it is employed in conjunction with proper oils in making varnishes. When mixed with lime in powder, it is said to make an extraordinary hard and durable cement.

JER d'Eau, a French term, frequently also used with us, for a fountain that casts up water to a considerable height in the air. See HYDROSTATICS, p. 564.

JETTY-HEAD, a name usually given in the royal dock-yards to that part of a wharf which projects beyond the rest; but more particularly the front of a wharf, whose side forms one of the cheeks of a dry or wet dock.

JEVER, a town of Germany, in the circle of Westphalia, and capital of Jeverland, with a citadel; 17 miles N. E. of Aurick, and 28 N. E. of Embden. E. lon. 7. 41. N. lat. 53. 33.

JEVERLAND, a territory of Germany, in Westphalia, belonging to the house of Anhalt Zerbst.

JEWEL, any precious stone, or ornament beset with them. See DIAMOND, RUBY, &c. Jewels made a part of the ornaments with which the Jews, Greeks and Romans, especially their ladies of distinction, adorned themselves. So prodigious was the extravagance of the Roman ladies, in particular, that Pliny the elder says he saw Lollia Paulina with an equipage of this kind, amounting, according to Dr. Arbuthnot's calculation, to 322,916l. 13s. 4d. of our money. It is worthy of observation, that precious stones amongst the Romans and all the ancients were much scarcer, and consequently in higher esteem, than they are amongst us since a commerce has been opened with the Indies. The ancients did not know how to cut and polish them to much perfection; but coloured stones were not scarce, and they cut them very well either hollow or in relief. When luxury had gained ground amongst them, the Romans hung pendants and pearls in their ears; and for this purpose the ears of both sexes were frequently bored. See EARS.

JEWEL (John) a learned English writer and bishop, was born in 1522, and educated at Oxford. This excellent prelate (says the Rev. Mr. Granger) was one of the greatest champions of the reformed religion, as he was to the church of England what Bellarmine was to that of Rome. His admirable Apology was translated from the Latin by Anne, the second of the four learned daughters of Sir Anthony Coke, and mother of Sir Francis Bacon. It was published, as it came from her pen, in 1564, with the approbation of the queen and the prelates. The same Apology was printed in Greek at Constantinople, under the direction of St. Cyril the patriarch. His defence of his Apology, against Harding and other Popish divines, was in such esteem, that Queen Elizabeth, King James I. King Charles I. and four successive archbishops, ordered it to be kept chained in all parish-churches for public use. His death happened at Monkton-Failey, in 1571, in the 50th year of his

JESUIT'S BARK.

Cinchona floribunda.



Cinchona brachycarpa.



Cinchona angustifolia



Cinchona lineata.



Cinchona caribæa.



Leaves of the Bark Tree of
Tecamez.



Cinchona corymbifera.



Cinchona macrocarpa.



age. He wrote, 1. A view of a seditious bull sent into England by Pope Pius V. in 1569. 2. A treatise on the Holy Scriptures. 3. An exposition of St. Paul's two epistles to the Thessalonians. 4. A treatise on the sacrament. 5. An apology for the national church. 6. Several sermons, controversial treatises, and other works.

JEWEL-Blocks, in the sea language, a name given to two small blocks which are suspended at the extremity of the main and fore-top sail yards, by means of an eye-bolt driven from without into the middle of the yard-arm, parallel to its axis. The use of these blocks is, to retain the upper part of the top-mast studding-sails beyond the skirts of the top-sails, so that each of those sails may have its full force of action, which would be diminished by the encroachment of the other over its surface. The *ba'iards*, by which those studding-sails are hoisted, are accordingly passed through the jewel-blocks; whence, communicating with a block on the top-mast head, they lead downwards to the top or decks, where they may be conveniently hoisted. See **SAIL**.

JEWS, a name derived from the patriarch Judah, and given to the descendants of Abraham by his eldest son Isaac, who for a long time possessed the land of Palestine in Asia, and are now dispersed through all nations in the world. The history of this people, as it is the most singular, so is it also the most ancient in the world; and the greatest part being before the beginning of profane history, depends entirely on the authenticity of the Old Testament, where it is only to be found. With regard to the religious doctrines and rites of the *Jews*, we shall here observe, that *Judaism* was but a temporary dispensation, and was to give way, at least the ceremonial part of it, at the coming of the Messiah. We have a complete system of *Judaism* in the books of Moses. The Jews were anciently divided into several sects; the principal whereof were the Pharisees, Sadducees, and Essenians. At present there are two sects among the Jews, viz. the Caraites, who admit of no rule of religion but the law written by Moses; and the Rabbinites, who add to the law the traditions of the Talmud.

It has been observed, that *Judaism*, of all religions, is that which is the most rarely abjured. In the 18th of Edward I. the parliament granted the king a fifteenth for the expulsion of *Judaism*.

In England formerly, the Jews, and all their goods, belonged to the chief lord where they lived; and he had such absolute property in them that he might sell them, for they had not liberty to remove to another lord without leave. Mat. Paris tells us, that Henry III. sold the Jews to earl Richard, his brother, for a term of years, that *quos rex excoriaverat comes evisceraret*.

They were distinguished from the Christians, both living and dying; for they had proper judges and courts wherein their causes were tried: and they wore a badge on their breast over their clothes, in shape of a table; and they were fined if they stirred abroad without such badges. They were never buried in the country, but always brought up to London, and interred without the walls.

In this enlightened period, however, a more generous system is taking place. France has allowed them the rights of citizens; which induces numbers of the most wealthy Jews to fix their residence in that country. England, Holland, and Prussia tolerate and protect them; and the emperor has revoked some restrictions; for which an edict has lately passed: Spain, Portugal, and some of the Italian states, are still, however, totally averse to their dwelling among them. By stat. 1 Ann. 1. c. 30. if Jewish parents refuse to allow their protestant children a sitting maintenance, suitable to the fortune of the parent, the lord chancellor, on complaint, may make such an order as he shall see proper.

Jew-bill, in *Law*, is the famous statute 26 Geo. II. cap. 26. which enabled all *Jews* to prefer bills of naturalization in parliament, without receiving the sacrament as ordained by stat. 7 Jac. 1. This act was repealed by 27 Geo. II. c. 1.

JEZIDES, among the Mahometans; a term of similar import with heretics among Christians. The Jezides are a numerous sect inhabiting Turkey and Persia, so called from their head Jezid, an Arabian prince, who slew the sons of Ali, Mahomet's father-in-law; for which reason he is reckoned a parricide, and his followers heretics. There are about 20,000 Jezides in Turkey and Persia; who are of two sorts, black and white. The white are clad like Turks; and distinguished only by their shirts, which are not slit at the neck like those of others, but have only a round hole to thrust their heads through. This is in memory of a golden ring, or circle of light, which descended from heaven upon the neck of their cheq, the head of their religion, after his undergoing a fast of forty days. The black Jezides, though married, are the monks or religious of the order; and these are called *Fakirs*.

The Turks exact excessive taxes from the Jezides, who hate the Turks as their mortal enemies; and when, in their wrath, they curse any creature, they call it *musulman*: but they are great lovers of the Christians, being more fond of Jesus Christ than of Mahomet, and are never circumcised but when they are forced to it. They are extremely ignorant, and believe both the bible and the koran without reading either of them: they make vows and pilgrimages, but have no places of religious worship.

All the adoration they pay to God consists of some songs in honour of Jesus Christ, the Virgin, Moses, and sometimes Mahomet; and it is a principal point of their religion never to speak ill of the Devil, lest he should resent the injury, if ever he should come to be in favour with God again, which they think possible; whenever they speak of him, they call him the *angel Peacock*. They bury their dead in the first place they come at, rejoicing as at a festival, and celebrating the entry of the deceased into heaven. They go in companies like the Arabians, and change their habitations every 15 days. When they get wine, they drink it to excess; and it is said that they sometimes do this with a religious purpose, calling it the blood of Christ. They buy their wives: and the market-price is 200 crowns for all women, handsome or not, without distinction.

JEZRAEL, or **JEZREEL**, a town in the north of Samaria, towards mount Carmel, where stood a palace of the kings of Israel, 1 Kings xxi. 18: on the borders of Galilee, (Joshua xix.) said to be one of the towns of Issachar. The valley of Jezreel (Judges vi. 17.) was situated to the north of the town, running from west to east for ten miles, between two mountains; the one to the north, commonly called *Herman*; near mount Tabor; the other, *Gilboa*: in breadth two miles.

IF, an island of France, the most eastern of the three before the harbour of Marseilles. It is very well fortified, and its port one of the best in the Mediterranean.

IGIS, a town of the country of the Grisons, in Caddea, with a magnificent castle, in which is a cabinet of curiosities, and a handsome library; 23 miles south-west of Chöira; and 23 south of Glaris. E. lon. 9. 0. N. lat. 46. 33.

IGLAW, a considerable and populous town of Germany, in Moravia, where they have a manufactory of good cloth, and excellent beer. It is seated on the river Igla, 40 miles west of Brin, and 62 south-east of Prague. E. lon. 15. 42. N. lat. 49. 8.

IGLESIAS, a town in the south part of the island of Sardinia, with a bishop's see. E. lon. 8. 59. N. lat. 38. 30.

IGNATIA, in botany, a genus of the monogynia order, belonging to the pentandria class of plants. The calyx is five-toothed; the corolla is long; the fruit an unilocular plum,

with many seeds. There is but one species, the *amara*, a native of India. The fruit of this tree contains the seeds called *St. Ignatius's beans*.

The best account of the plant that has yet appeared, is that sent by father Camelli to Ray and Petiver, and published in the *Philosophical Transactions* for the year 1699: he observes, that it grows in the Philippine islands, and winds itself about the tallest trees to the top; that it has large, ribbed, bitter leaves, a flower like that of the pomegranate, and a fruit larger than a melon. Some resemble the fruit to a pomegranate, probably from misapplying Camelli's words. The fruit is covered with a thin, glossy, blackish green, and as it were marbled shell, under which is lodged another of a stony hardness: within this is contained a soft, yellow, bitterish pulp, in which lie the seeds or beans, to the number commonly of 24, each covered with a silvery down.

The same gentleman gives an account of the virtues attributed to these seeds by the Indians; but experience has shown that they are dangerous. König relates, that a person, by drinking some of a spirituous tincture of them instead of aqua vitæ, was thrown into strong convulsions; and Dr. Gurn, that a dram of the seed in substance occasioned, for a time, a total deprivation of the senses. Others mention violent vomitings and purgings from its use. Neumann hath observed intermitting fevers removed by drinking, on the approach of a paroxysm, an infusion of some grains of the bean made in carduus water: we are not, however, from hence to look upon this medicine as an universal febrifuge, or to use it indiscriminately.

These beans (for so custom requires that we should call them) are about the size of a moderately large nutmeg; in figure somewhat roundish, but extremely irregular, scarcely any two being entirely alike, full of unequal depressions and prominences; in colour, externally yellowish brown, but when the outer skin is taken off, of a blackish brown, and in part quite blackish; in consistence, hard and compact as horn, so as not to be reducible into a powdery form, but by cutting or rasping: for all their hardness, however, they are not proof against worms. When fresh, they have somewhat of a musky smell, which by age is lost: their taste is very bitter, resembled by some to that of centaury.—According to some, it is from this plant that the *COLUMBO* root is obtained.

IGNATIUS LOYOLA, (canonized,) the founder of the well-known order of the *JESUITS*, was born at the castle of Loyola, in Biscay, 1491; and became first page to Ferdinand V. king of Spain, and then an officer in his army. In this last capacity, he signalized himself by his valour; and was wounded in both legs at the siege of Pampeluna, in 1521. To this circumstance the Jesuits owe their origin; for, while he was under cure of his wound, a *Life of the Saints* was put into his hands, which determined him to forsake the military for the ecclesiastical profession. His first devout exercise was to dedicate himself to the Blessed Virgin as her knight: he then went a pilgrimage to the Holy Land; and on his return to Europe, he continued his theological studies in the universities of Spain, though he was then 33 years of age. After this he went to Paris; and in France laid the foundation of this new order, the institutes of which he presented to Pope Paul III. who made many objections to them, but at last confirmed the institution in 1540. The founder died in 1555, and left his disciples two famous books: 1. *Spiritual exercises*; 2. *Constitutions or rules of the order*. But it must be remembered, that though these avowed institutes contain many privileges obnoxious to the welfare of society, the most diabolical are contained in the private rules intitled *Mnita secreta*, which were not discovered till towards the close of the last century; and most writers attribute

these, and even the constitutions, to Laynez, the second general of the order.

IGNATIUS (St.) surnamed *Theophrastus*, one of the apostolical fathers of the church, was born in Syria, and educated under the apostle and evangelist St. John, and intimately acquainted with some other of the apostles, especially St. Peter and St. Paul. Being fully instructed in the doctrines of Christianity, he was, for his eminent parts and piety, ordained by St. John, and confirmed about the year 67 bishop of Antioch, by those two apostles, who first planted Christianity in that city, where the disciples also were first called *Christians*. Antioch was then not only the metropolis of Syria, but a city the most famous and renowned of any in the East, and the ancient seat of the Roman emperors, as well as of the viceroys and governors. In this important seat he continued to sit somewhat above 40 years, both an honour and safeguard of the Christian religion, till the year 107, when Trajan the emperor, flushed with a victory which he had lately obtained over the Scythians and Daci, about the ninth year of his reign, came to Antioch to make preparations for a war against the Parthians and Armenians. He entered the city with the pomp and solemnities of a triumph; and as his first care usually was about the concerns of religion, he began presently to inquire into that affair. Christianity had by this time made such a progress, that the Romans grew jealous and uneasy at it. The prince, therefore, had already commenced a persecution against the Christians in other parts of the empire, which he now resolved to carry on here. However, as he was naturally of a mild disposition, though he ordered the laws to be put in force against them if convicted, yet he forbade them to be fought after.

In this state of affairs, Ignatius, thinking it more prudent to go himself than stay to be sent for, of his own accord presented himself to the emperor; and, it is said, there passed a long and particular discourse between them, wherein the emperor expressing a surprise how he dared to transgress the laws, the bishop took the opportunity to assert his own innocence, and to explain and vindicate his faith with freedom. The issue of this was, that he was cast into prison, and this sentence passed upon him, That, being incurably overrun with superstition, he should be carried bound by soldiers to Rome, and there thrown as a prey to wild beasts.

He was first conducted to Seleucia, a port of Syria, at about 16 miles distance, the place where Paul and Barnabas set sail for Cyprus. Arriving at Smyrna in Ionia, he went to visit Polycarp bishop of that place, and was himself visited by the clergy of the Asian churches round the country. In return for that kindness, he wrote letters to several churches, as the Ephesians, Magnesians, and Trallians, besides the Romans, for their instruction and establishment in the faith; one of these was addressed to the Christians at Rome, to acquaint them with his present state, and passionate desire not to be hindered in the course of martyrdom which he was now hastening to accomplish.

His guard, a little impatient of their stay, set sail with him for Troas, a noted city of the Lesser Phrygia, not far from the ruins of old Troy; where, at his arrival, he was much refreshed with the news he received of the persecution ceasing in the church of Antioch: hither also several churches sent their messengers to pay their respects to him; and hence too he dispatched two epistles, one to the church of Philadelphia, and the other to that of Smyrna; and, together with this last, as Eusebius relates, he wrote privately to Polycarp, recommending to him the care and inspection of the church of Antioch.

From Troas they sailed to Neapolis, a maritime town in Macedonia; thence to Philippi, a Roman colony, where they were entertained with all imaginable kindness and courtesy, and conducted forwards on their journey, passing on foot through Ma-

cedonia and Epirus, till they came to Epidanium, a city of Dalmatia; where again taking shipping, they sailed through the Adriatic, and arrived at Rhegium, a port-town in Italy; directing their course thence through the Tyrrhenian sea to Puteoli, whence Ignatius desired to proceed by land, ambitious to trace the same way by which St. Paul went to Rome. But this wish was not complied with; and after a stay of 24 hours, a prosperous wind quickly carried them to the Roman port, the great harbour and station for their navy, built near Ostia, at the mouth of the Tyber, about 16 miles from Rome; whither the martyr longed to come, as much desirous to be at the end of his race, as his keepers, weary of their voyage, were to be at the end of their journey.

The Christians at Rome, daily expecting his arrival, were come out to meet and entertain him, and accordingly received him with a mixture of joy and sorrow; but when some of them intimated, that possibly the populace might be taken off from desiring his death, he expressed a pious indignation, entreating them to cast no rubs in his way, nor do any thing that might hinder him now he was hastening to his crown. There are many such expressions as this in his epistle to the Romans, which plainly show that he was highly ambitious of the crown of martyrdom. Yet it does not appear that he rashly sought or provoked danger. Among other expressions of his ardour for suffering, he said, that the wild beasts had feared and refused to touch some that had been thrown to them; which he hoped would not happen to him. Being conducted to Rome, he was presented to the præfect, and the emperor's letters probably delivered concerning him. The interval before his martyrdom was spent in prayers for the peace and prosperity of the church. That his punishment might be the more pompous and public, one of their solemn festivals, the time of their Saturnalia, and that part of it when they celebrated their Sigillaria, was pitched on for his execution; at which time it was their custom to entertain the people with the bloody conflicts of gladiators, and the hunting and fighting with wild beasts. Accordingly, on the 13th kal. January, i. e. December 20, he was brought out into the amphitheatre; and the lions being let loose upon him, quickly dispatched their meal, leaving nothing but a few of the hardest of his bones. These remains were gathered up by two deacons who had been the companions of his journey; and, being transported to Antioch, were interred in the cemetery, without the gate that leads to Daphne; whence, by the command of the emperor Theodosius, they were removed with great pomp and solemnity to the Tychon, a temple within the city, dedicated to the public genius of it, but now consecrated to the memory of the martyr.

St. Ignatius stands at the head of those Antinician fathers, who have occasionally delivered their opinions in defence of the true divinity of Christ, whom he calls the *Son of God, and his eternal Word*. He is also reckoned the great champion of the doctrine of the episcopal order, as distinct and superior to that of priest and deacon. And one, the most important, use of his writings respects the authenticity of the holy Scriptures, which he frequently alludes to, in the very expressions as they stand at this day. -- Archbishop Usher's edition of his works, printed in 1647, is thought the best: yet there is a fresher edition extant at Amsterdam, where, beside the best notes, there are the dissertations of Usher and Pearson.

St. IGNATIUS'S *Beau*. See IGNATIA.

IGNIS FATUUS, a kind of light, of an electric nature, appearing frequently in mines, marshy places, and near stagnating waters. It was formerly thought by the superstitious to have something ominous in its nature, and to presage death and other misfortunes: and it is even said that there have been instances of people being decoyed by these lights into marshy places, where

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they have perished. Hence it took the names of *Ignis-fœtus*, *Will-with-a-wisp*, and *Jack-with-a-lantern*, as if this appearance was an evil spirit which took delight in doing mischief of that kind. See the articles LIGHT and METEOR.

IGNITION, properly signifies the setting fire to any substance; but the sense is commonly restrained to that kind of burning which is not accompanied with flame, such as that of charcoal, cinders, metals, stones, and other solid substances. The effects of ignition are first to dissipate what is called the *phlogiston* of the ignited substance, after which it is reduced to ashes. Vitrification next follows; and, lastly, the substance is totally dissipated in vapour. All these effects, however, depend on the presence of the air; for *in vacuo* the phlogiston of any substance cannot be dissipated. Neither can a body which is totally destitute of phlogiston be ignited in such a manner as those which are not deprived of it: for, as long as the phlogiston remains, the heat is kept up in the body by the action of the external air upon it; but when the phlogiston is totally gone, the air always destroys, instead of augmenting, the heat. Philosophers have therefore been greatly embarrassed in explaining the phenomena of ignition. See PHLOGISTON.

IGNOBILES, amongst the Romans, was the designation of such persons as had no right of using pictures and statues. See *Jus Imaginis*.

IGNOMINIA, a species of punishment amongst the Romans, whereby the offender suffered public shame, either by virtue of the prætor's edict, or by order of the censor. This punishment, besides the scandal, deprived the party of the privilege of bearing any offices, and almost all other liberties of a Roman citizen.

IGNORAMUS, in law, is a word properly used by the grand inquest empanelled in the inquisition of causes criminal and public, and written upon the bill whereby any crime is offered to their consideration, whenas they dislike their evidence as defective or too weak to make good the presentment; the effect of which word so written is, that all further inquiry upon that party for that fault is thereby stopped, and he delivered without further answer. It hath a resemblance with that custom of the ancient Romans, where the judges, when they absolved a person accused, did write *A.* upon a little table provided for that purpose, i. e. *absolvimus*; if they judged him guilty, they wrote *C.* i. e. *condemnamus*; if they found the cause difficult and doubtful, they wrote *N. L.* i. e. *non liquet*.

IGNORANCE, the privation or absence of knowledge. The causes of ignorance, according to Locke, are chiefly these three. 1. Want of ideas. 2. Want of a discoverable connection between the ideas we have. 3. Want of tracing and examining our ideas. See METAPHYSICS.

IGNORANCE, in a more particular sense, is used to denote illiteracy. Previous to the taking of Rome by the Gauls, such gross ignorance prevailed among the Romans, that few of the citizens could read or write, and the alphabet was almost unknown. During three ages there were no public schools, but the little learning their children had was taught them by their parents; and how little that was may be partly concluded from this circumstance, that a nail was usually driven into the wall of the temple of *Jupiter Capitolinus*, on the 15th of September, to assist the ignorance of the people in reckoning the years, because they were unacquainted with letters or figures. The driving of the nail was afterwards converted into a religious ceremony, and performed by the *Dictator*, to avert public calamities.

IGNORANCE, or mistake, in law, a defect of will, whereby a person is excused from the guilt of a crime, when, intending to do a lawful act, he does that which is unlawful. For here the deed and the will acting separately, there is not that conjunction between them which is necessary to form a criminal act.

But this must be an ignorance or mistake of fact, and not an error in point of law. As if a man intending to kill a thief or house-breaker in his own house, by mistake kills one of his own family, this is no criminal action: but if a man thinks he has a right to kill a person excommunicated or outlawed wherever he meets him, and does so, this is wilful murder. For a mistake in point of law, which every person of discretion not only may, but is bound and presumed to know, is, in criminal cases, no sort of defence. *Ignorantia juris quod quisque tenetur scire, neminem excusat*, is as well the maxim of our own law as it was of the Roman.

IGUANA, in zoology, a species of LACERPA. See the article BASILISCUS.

Mud-IGUANA. See MURÆNA.

IHOR, JOHOR, or *Jor*, a town of Asia, in Malacca, and capital of a province of the same name in the peninsula beyond the Ganges. It was taken by the Portuguese in 1603, who destroyed it, and carried off the cannon; but it has since been rebuilt, and is now in possession of the Dutch. E. lon. 93. 55. N. lat. 1. 15.

JIB, the foremost sail of a ship, being a large stay sail extended from the outer end of the bowsprit prolonged by the jib-boom, towards the fore-top-mast head. See SAIL. The jib is a sail of great command with any side wind, but especially when the ship is *close hauled*, or has the wind upon her beam; and its effort in *casting* the ship, or turning her head to leeward, is very powerful, and of great utility, particularly when the ship is working through a narrow channel.

JIB-Boom, a boom run out from the extremity of the bowsprit, parallel to its length, and serving to extend the bottom of the jib, and the stay of the fore-top-gallant mast. This boom, which is nothing more than a continuation of the bowsprit forward, to which it may be considered as a top-mast, is usually attached to the bowsprit by means of two large boom irons, or by one boom iron, and a cap on the outer end of the bowsprit; or, finally, by the cap without and a strong lashing within, instead of a boom iron, which is generally the method of securing it in small merchant ships. It may therefore be drawn in upon the bowsprit as occasion requires; which is usually practised when the ship enters a harbour, where it might very soon be broken or carried away by the vessels which are moored therein, or passing by under sail.

JIBBEL AUREZ, the mons auraceus of the middle age, an assemblage of many very rocky mountains in Africa, in the kingdom of Algiers. Here Mr. Bruce met with a race of people much fairer in the complexion than any of the nations to the southward of Britain: their hair was red, and their eyes blue: they maintain their independence, and are of a savage disposition, so that our traveller found it difficult to approach them with safety. They are called Neardia; and each of them has a Greek cross in the middle between the eyes, marked with antimony. They are divided into tribes, but, unlike the other Arabs, have huts in the mountains, built of mud and straw; and are, by our author, supposed to be a remnant of the Vandals. He even thinks that they may be descended from the remainder of an army of Vandals mentioned by Procopius, which was defeated among these mountains. They live in perpetual war with the Moors, and boast that their ancestors were Christians. They pay no taxes.

JIDDA, a town of Arabia, situated, according to Mr. Bruce, in N. lat. 28° 0' 1". E. lon. 39° 16' 45". It is situated in a very unwholesome, barren, and desert part of the country. Immediately without the gate to the eastward is a desert plain filled with the huts of the Bedoweens or country Arabs, built of long bundles of spartum or bent-grass put together like fascines. These people supply the town with milk and butter. "There is no stirring out of the town (says Mr. Bruce) even for a walk,

unless for about half a mile on the south-side by the sea, where there is a number of stinking pools of stagnant water, which contributes to make the town very unwholesome."

From the disagreeable and inconvenient situation of this port, it is probable that it would have been long ago abandoned, had it not been for its vicinity to Mecca, and the vast annual influx of wealth occasioned by the India trade; which, however, does not continue, but passes on to Mecca, whence it is dispersed all over the east. The town of Jidda itself receives but little advantage, for all the customs are immediately sent to the needy and rapacious sheriff of Mecca and his dependents. "The gold (says Mr. Bruce) is returned in bags and boxes, and passes on as rapidly to the ships as the goods do to the market, and leaves as little profit behind. In the mean time provisions rise to a prodigious price; and this falls upon the townsmen, while all the profit of the traffic is in the hands of strangers; most of whom, after the market is over (which does not last six weeks), retire to Yemen and other neighbouring countries, which abound in every sort of provision.

From this scarcity Mr. Bruce supposes it is that polygamy is less common here than in any other part of Arabia. "Few of the inhabitants of Jidda (says our author) can avail themselves of the privilege granted by Mahomet. He cannot marry more than one wife, because he cannot maintain more; and from this cause arise the want of people and the number of unmarried women."

The trade at Jidda is carried on in a manner which appeared very strange to our traveller. "Nine ships (says he) were there from India; some of them worth, I suppose, 200,000l. One merchant, a Turk, living at Mecca, 30 hours journey off, where no Christian dares go, whilst the continent is open to the Turk for escape, offers to purchase the cargoes of four out of these nine ships himself; another of the same cast comes and says he will buy none unless he has them all. The samples are shown, and the cargoes of the whole nine ships are carried into the wildest parts of Arabia by men with whom one would not wish to trust himself alone in the field. This is not all; two India brokers come into the room to settle the price; one on the part of the India Captain, the other on that of the buyer the Turk. they are neither Mahometans nor Christians, but have credit with both. They sit down on the carpet, and take an India shawl, which they carry on their shoulder like a napkin, and spread it over their hands. They talk in the mean time indifferent conversation, as if they were employed in no serious business whatever. After about 20 minutes spent in handling each other's fingers below the shawl, the bargain is concluded, say for nine ships, without one word ever having been spoken on the subject, or pen or ink used in any shape whatever. There never was one instance of a dispute happening in these sales. But this is not all; the money is yet to be paid. A private Moor, who has nothing to support him but his character, becomes responsible for the payment of these cargoes. This man delivers a number of coarse hempen bags full of what is supposed to be money. He marks the contents upon the bag, and puts his seal upon the string that ties the mouth of it. This is received for what is marked upon it, without any one ever having opened one of the bags; and in India it is current for the value marked upon it as long as the bag lasts."

The port of Jidda is very extensive, and contains numberless shoals, small islands, and sunk rocks, with deep channels, however, between them; but in the harbour itself ships may ride secure, whatever wind blows. The only danger is in the coming in or going out; but as the pilots are very skilful, accidents are never known to happen. The charts of this harbour, as Mr. Bruce informs us, are exceedingly erroneous. While he staid here, he was desired by Captain Thornhill to make a new chart of the harbour; but finding that it had been undertaken by ano-

ther gentleman, Captain Newland, he dropped it. He argues in the strongest terms against the old maps, which he says can be of no use, but the contrary; and he gives it as a characteristic of the Red sea, "scarce to have soundings in any part of the channel, and often on neither side; whilst ashore, soundings are hardly found a boat length from the main. To this, says he, I will add, that there is scarce one island on which I ever was, where the bolt-spirit was not over the land, while there were no soundings by a line heaved over the stern. Of all the vessels in Jidda, only two had their log-lines properly divided; and yet all were so fond of their supposed accuracy, as to aver they had kept their course within five leagues between India and Babel-mandel. Yet they had made no estimation of the currents without the straits, nor the different very strong ones soon after passing Socotra; their half minute glasses, upon a medium, ran 57 seconds: they had made no observations on the tides or currents in the Red sea, either in the channel or in the inward passage; yet there is delineated in this map a course of Captain Newland's which he kept in the middle of the channel, full of sharp angles and short fetches; you would think every yard was measured and sounded!"

JIG, a well known lively tune to which people dance. See Music.

JIN. See GENII.

JIONPOUR, a small city of Hindoostan Proper, capital of a circar of the same name, in the district of Benares. It is seated on the Goomty; and not far from the confluence of that river with the Ganges, stands the fort of Jionpour, a building of considerable extent, on a high bank commanding the bridge over the Goomty. It is now chiefly in ruins; although formerly it commanded the country from the Ganges quite to Lucknow. This place was at one time the seat of an empire. Chaja Jehan, vizier to sultan Mahommud Shah, during the minority of his son Mamood Shah assumed the title of sultan Shirki, or king of the East, took possession of Bahar, and fixed his residence at Jionpour, where he built the great musjud, or mausoleum, which is still remaining, for himself and family. The bridge over the Goomty is built of stone, and consists of 16 pointed arches. On the top of the bridge are many little shops on both sides, built of stone. It was built in 1567, upon such sound principles, as to have withstood, for such a length of time, the force of the stream, which, in the time of the rains, is very great. The inundations have been known to rise frequently over the bridge, inasmuch that in the year 1774 a whole brigade of the British army (that is, 10,000 men) passed over it in boats. Jionpour is 49 miles N. W. of Benares. E. lon. 84. 7. N. lat. 25. 45.

IKENILD STREET, one of the four famous ways which the Romans made in England, called *Stratum Icenorum*, because it began in the country of the *Iceni*, who inhabited Norfolk, Suffolk, and Cambridgeshire.

ILA, or ISLAY, an island of Scotland, one of the Hebrides, to the S. W. of Jura. Its greatest length is 25 miles; its breadth 18. The principal village is Bowmore, which is in a manner a new town, and has a convenient harbour. The face of the country is hilly. Several mines are wrought to great advantage; and the lead ore is very rich and productive. Here likewise are copper, emery, native quicksilver, and black lead: with immense stores of limestone, marl, coral, and shell-sand, for manure. Much corn and flax is raised here, and a great number of cattle exported. In this, and some of the neighbouring islands, multitudes of adders infest the heath. On the N. W. side of the island is the cave of Sannymore, which is a grotto, divided into a number of far-winding passages, sometimes opening into fine expanses; again closing; for a long space, into galleries, and forming a curious subterraneous labyrinth. There are also many other caverns, the haunts of numerous wild pigeons,

that lodge and breed in them. The goats that feed among the rocks are so wild that they are obliged to be shot like deer. Some vestiges of antiquity are on this island; particularly, the remains of a circular dry stone building, on the hill of Loffet, near the Sound of Islay. This hill contains fine iron ore and emery.

ILANTS, a town in the country of the Grisons, capital of the Grey League. It contains about 60 houses, and is partly surrounded by walls; being the only walled town, except Coire, among the Grisons. It is remarkable for being the place where the general diet of the Three Leagues assembles every third year. It is seated on the Rhine, 17 miles S. W. of Coire.

ILCHESTER, a town of Somersetshire, with a market on Wednesday. It is seated on the river Yeovil, and is a town of great antiquity, as appears by the Roman coins dug up. It once had sixteen churches, now only two; is a corporation, sends two members to parliament, and here the county gaol is kept. It is 16 miles S. of Wells, and 123 W. by S. of London. W. lon. 2. 37. N. lat. 50. 56.

ILDEFONSO, St. a magnificent palace of the king of Spain, in New Castile, and in the territory of Segovia, built by Philip V. It has very fine water-works and gardens.

ILDEFONSO DE LOS ZAPOTACOS, St. a town of N. America, in New Spain, seated on a mountain, 50 miles N. E. of Antequera. W. lon. 27. 30. N. lat. 17. 5.

ILDERTON, a village in Northumberland, situated S. of Woller. On a hill near it is a semicircular encampment, defended by two high rampires of earth, and a deep fosse, with an inner circle of stones, which appear uncemented. The area is about 100 yards diameter, and contains many remains of buildings.

ILERDA, in ancient geography, the capital of the Iligertes, situated on an eminence between the rivers Sicoris and Cinga; an unhappy city, often besieged, and often taken, because lying exposed to the incursions from Gaul; and under Gallienus it was destroyed by the Germans. Now LERIDA, in Catalonia, on the river Segra.

ILESUGAGUEN, a strong town of Africa, in the kingdom of Morocco, and province of Hea, seated on a mountain.

ILEX, the HOLM or HOLLY Tree; a genus of the tetragynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 43d order, *Dumosee*. The calyx is quadridentated; the corolla rotaceous; there is no style; the berry is monospermous. There are several species of this genus; but the most remarkable is the aquifolium, or common holly. Of this there are a great number of varieties with variegated leaves, which are propagated by the nursery gardeners for sale, and some years past were in very great esteem; but at present are but little regarded, the old taste of filling gardens with thorn evergreens being pretty well abolished: however, in the disposition of clumps, or rather plantations, of evergreen trees and shrubs, a few of the most lively colours may be admitted, which will have a good effect in the winter season, if they are properly disposed. The best of these varieties are the painted lady-holly, British holly, Bradley's best holly, phyllis or cream-holly, milkmaid holly, Prichet's best holly, gold-edged hedgehog holly, Chyney's holly, glory-of-the-west holly, Broaderick's holly, Partridge's holly, Herefordshire white holly, Blind's cream holly, Longstaff's holly, Eales's holly, silver-edged hedgehog holly. All these varieties are propagated by budding or grafting them upon stocks of the common green holly: there is also a variety of the common holly with smooth leaves; but this is frequently found intermixed with the prickly-leaved on the same tree, and often on the same branch there are both sorts of leaves.

The common holly grows naturally in woods and forests in many parts of England, where it rises from 20 to 30 feet high, and sometimes more, but their ordinary height is not above 25 feet;

the stem by age becomes large, and is covered with a greyish smooth bark; and those trees which are not lopped, or browsed by cattle, are commonly furnished with branches the greatest part of their length, to form a sort of cone; the branches are garnished with oblong oval leaves, of a lucid green on their upper surface, but are pale on their under, having a strong midrib: the edges are indented and waved, with sharp thorns terminating each of the points, so that some of the thorns are raised upward, and others are bent downward; and being very stiff, they are troublesome to handle. The leaves are placed alternate on every side of the branches; and from the base of their footstalks come out the flowers in clusters, standing on very short footstalks; each of these sustains five, six, or more flowers. They are of a dirty white, and appear in May; but are succeeded by roundish berries, which turn to a beautiful red about Michaelmas, and continue on the trees, if they are not destroyed, till after Christmas.

The common holly is a very beautiful tree in winter, therefore deserves a place in all plantations of evergreen trees and shrubs, where its shining leaves and red berries make a fine variety; and if a few of the best variegated kinds are properly intermixed, they will enliven the scene. It is propagated by seeds, which never come up the first year, but lie in the ground as the haws do; therefore the berries should be buried in the ground one year, and then taken up and sown at Michaelmas, upon a bed exposed only to the morning sun: the following spring the plants will appear, which must be kept clean from weeds; and if the spring should prove dry, it will be of great service to the plants if they are watered once a week; but they must not have it oftener, nor in too great quantity, for too much moisture is very injurious to these plants when young. In this seed-bed the plants may remain two years; and then should be transplanted in the autumn, into beds at about six inches asunder, where they may stand two years longer; during which time they must be constantly kept clean from weeds; and if the plants have thriven well, they will be strong enough to transplant where they are designed to remain: for when they are transplanted at that age, there will be less danger of their failing, and they will grow to a larger size than those which are removed when they are much larger; but if the ground is not ready to receive them at that time, they should be transplanted into a nursery, in rows at two feet distance, and one foot asunder in the rows, in which place the plants may remain two years longer; and if they are designed to be grafted or budded with any of the variegated kinds, that should be performed after the plants have grown one year in the nursery: but the plants so budded or grafted should continue two years after in the nursery, that they may make good shoots before they are removed; though the plain ones should not stand longer than two years in the nursery, because when they are older they do not transplant so well. The best time for removing hollies is in the autumn, especially in dry land; but where the soil is cold and moist, they may be transplanted with great safety in the spring, if the plants are not too old, or have not stood long unremoved; for, if they have, there is great doubt of their growing when removed.

Sheep in the winter are fed with croppings of holly. Birds eat the berries. The bark fermented and afterwards washed from the woody fibres, makes the common bird-lime. The plant makes an impenetrable fence, and bears cropping: however, it is not found in all respects to answer for this purpose equally well with the hawthorn. The wood is used in lineering, and is sometimes stained black to imitate ebony. Handles for knives and cogs for mill-wheels are made of it. It is also made into bones for whetting of razors. Mr. Miller says, he has seen the floor of a room laid with compartments of holly and mahogany, which had a very pretty effect.

ILFORD, GREAT, a village of Essex, on the river Roding,

which is navigable hence to the Thames. This place, and Little Ilford adjoining, are hamlets to the town of Barking. It is seven miles N. E. by E. of London.

ILFRACOMBE, a seaport of Devonshire, with a market on Saturday. It has a spacious basin, formed by a good pier projecting into the Bristol Channel. The high tides here allow large vessels to enter the harbour. This port employs a number of brigs and sloops, chiefly in carrying ore from Cornwall, coal from Wales, and corn to Bristol. A number of fishing skiffs belong to this place, which, with those of Minehead, fish on a bank off the coast during the summer, and take a number of soals, turbot, &c. for the Bristol market. It is seated almost opposite Swansea, in Glamorganshire, and is 49 miles N. N. W. of Exeter, and 181 W. by S. of London. W. lon. 4. 5. N. lat. 51. 14.

ILHEOS, a seaport of S. America, capital of Rio-dos-Ilheos, in Brasil. It is seated in a fertile country. W. lon. 41. 25. S. lat. 15. 5.

ILIAC PASSION, a violent and dangerous kind of colic; called also *volvulus*, *miserere mei*, and *chordeus*. It takes its name from the intestine *ilion*, on account of its being usually affected; or perhaps from the Greek verb *ειλειν* "to wind or twist;" whence also it is the Latins call it *volvulus*. See MEDICINE.

ILIAD, the name of an ancient epic poem, the first and finest of those composed by Homer. The poet's design in the Iliad was to show the Greeks, who were divided into several little states, how much it was their interest to preserve a harmony and good understanding among themselves: for which end he sets before them the calamities that befel their ancestors from the wrath of Achilles, and his misunderstanding with Agamemnon; and the advantages that afterwards accrued to them from their union. The Iliad is divided into 24 books or rhapsodies, which are marked with the letters of the alphabet.

ILISSUS, a river running to the east of Athens; which, with the Eridanus running on the west side, falls below the city into the sea. Sacred to the muses, called *Iliades*; on whose bank their altar stood, and where the lustration in the less mysteries was usually performed.

ILIUM, ILION, or *Ilios*, in ancient geography, a name for the city of Troy, but most commonly used by the poets and distinguished by the epithet *Petis*; at a greater distance from the sea than what was afterwards called *Ilium Novum*, and thought to be the *Iliensium Pagus* of Strabo. New or modern Ilium was a village nearer the sea, with a temple of Minerva; where Alexander, after the battle of Granicus, offered gifts, and called it a city, which he ordered to be enlarged. His orders were executed by Lyfimachus, who encompassed it with a wall of 40 stadia. It was afterwards adorned by the Romans, who granted it immunities as to their mother city. From this city the *Ilias* of Homer takes its name, containing an account of the war carried on between the Greeks and Trojans on account of the rape of Helen: a variety of disasters being the consequence, gave rise to the proverb *Ilias Malorum*.

ILKUCH, a former royal town of Poland, in the palatinate of Cracow, remarkable for its silver-mines mixed with lead. It is seated in a barren and mountainous country, in E. lon. 20. 0. N. lat. 50. 26.

ILLECEBRUM, in botany; a genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 12th order, *Holoraceæ*. The calyx is pentaphyllous, and cartilaginous; there is no corolla; the stigma is simple; the capsule quinquevalved, and monospermous. There are several species, of which the most remarkable are the *paronychia* and the *capitatum*. Both these have trailing stalks near two feet long, which spread on the ground, garnished with small leaves like those of knot-grass. The heads

of the flowers come out from the joints of the stalks, having neat silvery bractæe surrounding them, which make a pretty appearance. Their flowers appear in June, and there is generally a succession of them for at least two months; and when the autumn proves warm, they will ripen their seeds in October. They are propagated by seeds, which should be sown in a bed of light earth in the beginning of April; the plants will come up in May, when they should be kept clean from weeds till they are fit to remove. Some should be planted in small pots, and the rest in a warm border, observing to water and shade them till they have taken new root. These plants are sometimes killed in severe winters; for which reason it is directed to plant some of them in pots, that they may be sheltered during that season.

ILLINOIS, a large river of N. America, which rises in the western territory, near the S. end of lake Michigan, and, taking a S. W. course, falls into the Mississippi. Between the Illinois and the Ohio is the country of a noted Indian nation, called the Illinois.

ILLICIUM, in botany; a genus of the pentagynia order, belonging to the dodecandria class of plants; and in the natural method ranking with those of which the order is doubtful. The calyx is tetraphyllous, and deciduous; there are eight petals, and eight petaloid subulated nectaria. There are 16 stamina with bifid antheræ; the capsules are ovate, compressed, and monospermous. There are two species, viz. 1. The *floridanum*, with red flowers, and very odorous fruit. It is a native of China. 2. The *anisatum*, a native of the woods of China and Japan. It rises with an erect branched stem to the height of a cherry-tree; and is covered with an ash-coloured bark, under which is another bark that is green, fleshy, somewhat mucous, and of an aromatic taste, combined with a small degree of astringency. The wood is hard and brittle; the pith small in quantity, fungous, and of a green herbaceous colour. The leaves resemble those of laurel; the flowers, in some sort, those of narcissus. These last generally stand single, are of a pale white, and consist of 16 petals, which differ in their form. The extremity of the flower-stalk being continued into the germen or seed-bud of the flower, forms eight conjoined capsules, or one deeply divided into eight parts. Of these capsules, some frequently decay; the rest inclose each a single seed, somewhat resembling that of palma christi, and which, when the hardish corticle that closely covers and involves it is broken, exhibits a kernel that is white, fleshy, soft, and of a vapid taste. The bonzes, or priests, of China and Japan infuse into the inhabitants a superstitious belief, that the gods are delighted with the presence of this tree. Hence they generally place before their idols garlands and bundles made of the branches. A similar opinion the Bramins inculcate into the Indians, of the Malabar fig, or *scæus religiosa*. The bark of the anise-tree, reduced to powder, and equally burnt, the public watchmen in Japan, by a very curious contrivance described by Kempfer, render useful in the measuring of time during the darkness of the night. The same powder is frequently burnt in brazen vessels on the Japanese altars, as incense is in other countries, from a belief that the idols in whose honour the ceremony is performed are greatly refreshed with the agreeable fragrauncy of its odour. It is remarkable, that a branch of this tree being added to the decoction of the poisonous fish, termed by the Dutch *de opblafer* (a fish the most delicate for eating, if the poisonous matter be first properly expelled), increases its noxious quality, and exasperates the poison to an astonishing degree of activity and power.

ILLUMINATING, a kind of miniature-painting, anciently much practised for illustrating and adorning books. Besides the writers of books, there were artists whose profession was to ornament and paint manuscripts, who were called *illuminators*: the writers of books first finished their part, and the illuminators embellished them with ornamented letters and

paintings. We frequently find blanks left in manuscripts for the illuminators, which were never filled up. Some of the ancient manuscripts are gilt and burnished in a style superior to later times. Their colours were excellent, and their skill in preparing them must have been very great.

The practice of introducing ornaments, drawings, emblematical figures, and even portraits, into manuscripts, is of great antiquity. Varro wrote the lives of seven hundred illustrious Romans, which he enriched with their portraits, as Pliny attests in his Natural History (lib. xxxv. cap. 2.). Pomponius Atticus, the friend of Cicero, was the author of a work on the actions of the great men amongst the Romans, which he ornamented with their portraits, as appears in his Life by Cornelius Nepos (cap. 18.). But these works have not been transmitted to posterity. There are, however, many precious documents remaining, which exhibit the advancement and decline of the arts in different ages and countries. These inestimable paintings and illuminations display the manners, customs, habits, ecclesiastical, civil, and military, weapons and instruments of war, utensils and architecture of the ancients; they are of the greatest use in illustrating many important facts relative to the history of the times in which they were executed. In these treasures of antiquity are preserved a great number of specimens of Grecian and Roman art, which were executed before the arts and sciences fell into neglect and contempt. The manuscripts containing these specimens form a valuable part of the riches preserved in the principal libraries of Europe: the Royal, Cottonian, and Harleian libraries, as also those in the two universities in England, the Vatican at Rome, the Imperial at Vienna, the National at Paris, St. Mark's at Venice, and many others.

A very ancient MS. of Genesis, which was in the Cottonian library, and almost destroyed by a fire in 1731, contained two hundred and fifty curious paintings in water colours. Twenty-one fragments, which escaped the fire, are engraven by the society of antiquaries of London. Several specimens of curious paintings also appear in Lambecius's catalogue of the imperial library at Vienna, particularly in vol. iii. where forty-eight drawings of nearly equal antiquity with those in the Cottonian library are engraven; and several others may be found in various catalogues of the Italian libraries. The drawings in the Vatican Virgil, made in the fourth century, before the arts were entirely neglected, illustrate the different subjects treated of by the Roman poet. A miniature drawing is prefixed to each of the gospels brought over to England by St. Augustine in the sixth century, which is preserved in the library of Corpus Christi college, Cambridge; in the compartments of those drawings are depicted representations of several transactions in each gospel. The curious drawings and elaborate ornaments in St. Cuthbert's gospels made by St. Ethelwald, and now in the Cottonian library, exhibit a striking specimen of the state of the arts in England in the seventh century. The same may be observed with respect to the drawings in the ancient copy of the four gospels preserved in the cathedral church of Litchfield, and those in the Codex Rushworthianus in the Bodleian library at Oxford. The life of St. Paul the hermit, now remaining in Corpus Christi college, Cambridge, (G. 2.), affords an example of the style of drawing and ornamenting letters in England in the eighth century; and the copy of Prudentius's *Psycomachia* in the Cottonian library (Cleop. c. 8.) exhibits the style of drawing in Italy in the ninth century. Of the tenth century there are Roman drawings of a singular kind in the Harleian library (N^o 2820.) N^o 5280, 1802, and 437, in the same library, contain specimens of ornamented letters, which are to be found in Irish MSS. from the twelfth to the fourteenth century. Cædmon's Poetical Paraphrase of the book of Genesis, written in the eleventh century, which is preserved amongst F. Junius's MSS. in the Bodleian library, exhibits many speci-

mens of utensils, weapons, instruments of music, and implements of husbandry used by the Anglo-Saxons. The like may be seen in extracts from the Pentateuch of the same age, in the Cottonian library (Claud. B. 4.). The manuscript copy of Terence in the Bodleian library (D. 17.) displays the dresses, masks, &c. worn by comedians in the twelfth century, if not earlier. The very elegant Psalter in the library of Trinity College, Cambridge, exhibits specimens of the art of drawing in England in the same century. The Virgil in the Lambeth library of the 13th century (N^o 471.), written in Italy, shows, both by the drawings and writing, that the Italians produced works much inferior to ours at that period. The copy of the Apocalypse in the same library (N^o 209) contains a curious example of the manner of painting in the fourteenth century. The beautiful paintings in the history of the latter part of the reign of king Richard II. in the Harleian library (N^o 1319), afford curious specimens of manners and customs, both civil and military, at the close of the fourteenth and in the beginning of the fifteenth century; as does N^o 2278 in the same library. Many other instances might be produced; but those who desire farther information may consult Strutt's *Regal and Ecclesiastical Antiquities*, 4to, and his *Horda-Angel cynnan* published in three vols.

This art was much practised by the clergy, and even by some in the highest stations in the church. "The famous Osmund (says Bromton), who was consecrated bishop of Salisbury A. D. 1076, did not disdain to spend some part of his time in writing, binding, and *illuminating* books." Mr. Strutt, as already noticed, has given the public an opportunity of forming some judgment of the degree of delicacy and art with which these illuminations were executed, by publishing prints of a prodigious number of them, in his *Regal and ecclesiastical antiquities of England*, and *View of the customs, &c. of England*. In the first of these works we are presented with the genuine portraits, in miniature, of all the kings, and several of the queens of England, from Edward the Confessor to Henry VII. mostly in their crowns and royal robes, together with the portraits of many other eminent persons of both sexes.

The illuminators and painters of this period seem to have been in possession of a considerable number of colouring materials, and to have known the arts of preparing and mixing them, so as to form a great variety of colours: for, in the specimens of their miniature paintings that are still extant, we perceive not only the five primary colours, but also various combinations of them. Though Strutt's prints do not exhibit the bright and vivid colours of the originals, they give us equally a view, not only of the persons and dresses of our ancestors, but also of their customs, manners, arts, and employments, their arms, ships, houses, furniture, &c. and enable us to judge of their skill in drawing. The figures in those paintings are often stiff and formal; but the ornaments are in general fine and delicate, and the colours clear and bright, particularly the gold and azure. In some of these illuminations the passions are strongly painted. How strongly, for example, is terror painted in the faces of the earl of Warwick's sailors, when they were threatened with a shipwreck, and grief in the countenances of those who were present at the death of that hero! See Strutt, vol. ii. plates 56 and 58. After the introduction of printing, this elegant art of illuminating gradually declined, and at length was quite neglected.

Before concluding, it may not be improper to observe, that from the fifth to the tenth century the miniature paintings which we meet with in Greek MSS. are generally good, as are some which we find among those of Italy, England, and France. From the tenth to the middle of the fourteenth century they are commonly very bad, and may be considered as so many monuments of the barbarity of those ages: towards the

latter end of the fourteenth, the paintings in manuscripts were much improved; and in the two succeeding centuries many excellent performances were produced, especially after the happy period of the restoration of the arts, when great attention was paid to the works of the ancients, and the study of antiquity became fashionable.

ILLUMINED, *ILLUMINATI*, a church term, anciently applied to such persons as had received baptism. This name was occasioned by a ceremony in the baptism of adults; which consisted in putting a lighted taper in the hand of the person baptized, as a symbol of the faith and grace he had received in the sacrament.

ILLUMINED, *Illuminati*, is also the name of a sect of heretics, who sprang up in Spain about the year 1575, and were called by the Spaniards *Alambrados*. Their principal doctrines were, that by means of a sublime manner of prayer, which they had attained to, they entered into so perfect a state, that they had no occasion for ordinances, sacraments, nor good works; and that they could give way even to the vilest actions without sin. The sect of Illumined were revived in France in the year 1634, and were soon after joined by the Guerinets, or disciples of Peter Guerin, who together made but one body, called also ILLUMINED: but they were so hotly pursued by Louis XIII. that they were soon destroyed. The brothers of the Rosy Cross are sometimes also called Illumined. See RO-SYCRUSIAN.

ILLUSTRIOUS, *ILLUSTRIS*, was heretofore, in the Roman empire, a title of honour peculiar to people of a certain rank. It was first given to the most distinguished among the knights, who had a right to bear the *latus clavus*: afterwards those were entitled *illustrious* who held the first rank among those called *honorati*; that is, the *præfecti prætorii*, *præfecti urbis*, *treasurers*, *comites*, &c. There were, however, different degrees among the *illustrious*: as in Spain they have *grandees* of the first and second class, so in Rome they had their *illustres*, whom they called great, *majores*; and others less, called *illustres minores*. For instance, the *præfectus prætorii* was a degree below the master of the offices, though they were both *illustres*. The Novels of Valentinian distinguish as far as five kinds of *illustres*; among whom, the *illustres administratores* bear the first rank.

ILLYRICUM, (*Solum* perhaps understood) *Livy*, *Herodian*, *St. Paul*; called *Illyris* by the Greeks, and sometimes *Illyria*: the country extending from the Adriatic to Pannonia thus called. Its boundaries are variously assigned. *Pliny* makes it extend in length from the river *Arfia* to the *Drinius*, thus including *Liburnia* to the west, and *Dalmatia* to the east: which is also the opinion of *Ptolemy*; who settles its limits from mount *Scardus* and the Upper *Mœsia* on the east, to *Istria* in the west. A Roman province, divided by *Augustus* into the Superior and Inferior, but of which the limits are left undetermined both by ancient historians and geographers. *Illyrii* the people; called *Illyres* by the Greeks. The country is now called *Slavonia*.

ILLYRIUS, (*MATTHIAS*, *FLACCUS*, or *FRANCOWITZ*), one of the most learned divines of the Augsburgh confession, born in *Istria*, anciently called *Illyria*, in 1520. He is said to have been a man of vast genius, extensive learning, of great zeal against Popery; but of such a restless and passionate temper, as overbalanced all his good qualities, and occasioned much disturbance in the Protestant church. He published a great number of books, and died in 1575.

IMAGE, in a religious sense, is an artificial representation or similitude of some person or thing, used either by way of decoration and ornament, or as an object of religious worship and adoration; in which last sense it is used indifferently with the word *IDOL*.

The noble Romans preserved the *images* of their ancestors with a great deal of care and concern, and had them carried in procession at their funerals and triumphs: these were commonly made of wax, or wood, though sometimes of marble or brass. They placed them in the vestibules of their houses; and they were to stay there, even if the houses happened to be sold, it being accounted impious to displace them. Appius Claudius was the first who brought them into the temples, in the year of Rome 259; and he added inscriptions to them, showing the origin of the persons represented, and their brave and virtuous achievements. It was not, however, allowed for all, who had the *images* of their ancestors in their houses, to have them carried at their funerals; this was a thing only granted to such as had honourably discharged themselves of their offices: for those who failed in this respect forfeited that privilege; and in case they had been guilty of any great crime, their *images* were broken in pieces. See *IGNOBILES* and *JUS*.

The Jews absolutely condemn all *images*, and do not so much as suffer any statues or figures in their houses, much less in their synagogues or places of worship.

The use and adoration of *images* have been a long time subjects of controversy in the world.

It is plain, from the practice of the primitive church, recorded by the earlier fathers, that Christians, for the first three centuries after Christ, and the greater part of the fourth, neither worshipped *images* nor used them in their worship. However, the greater part of the Popish divines maintain, that the use and worship of *images* were as ancient as the Christian religion itself: to prove this, they allege a decree, said to have been made in a council held by the Apostles at Antioch, commanding the faithful, that they may not err about the object of their worship, to make *images* of Christ and worship them. Baron. ad ann. 102. But no notice is taken of this decree, till 700 years after the Apostolic times, after the dispute about *images* had commenced. The first instance that occurs in any credible author of *images* among Christians, is recorded by Tertullian de Pudicit. c. 10. of certain cups, or chalices, as Bellarmine pretends, on which was represented the parable of the good shepherd carrying the lost sheep on his shoulders: but this instance only proves, that the church, at that time, did not think emblematical figures unlawful ornaments of cups or chalices. Another instance is taken from Eusebius, Hist. Eccl. lib. vii. cap. 18. who says, that in his time there were to be seen two brass statues in the city of Paneas or Cæsarea Philippi; the one of a woman on her knees, with her arm stretched out; the other of a man over against her, with his hand extended to receive her: these statues were said to be the *images* of our Saviour and the woman whom he cured of an issue of blood. From the foot of the statue representing our Saviour, says the historian, sprung up an exotic plant, which, as soon as it grew to touch the border of his garment, was said to cure all sorts of distempers. Eusebius, however, vouches none of these things; nay, he supposes that the woman who erected this statue of our Saviour was a pagan, and ascribes it to a pagan custom. Further, Philostorgius, Eccl. Hist. lib. vii. c. 3. expressly says, that this statue was carefully preserved by the Christians, but that they paid no kind of worship to it, because it is not lawful for Christians to worship brass or any other matter. The primitive Christians abstained from the worship of *images*, not, as the Papists pretend, from tenderness to heathen idolaters, but because they thought it unlawful in itself to make any *images* of the Deity. Justin. Mart. Apol. ii. p. 44. Clem. Alex. Strom. 5. Strom. 1. and Protr. p. 6. Aug. de Civit. Dei, lib. vii. c. 5. and lib. iv. c. 32. Id. de Fide et Symb. c. 7. Lactant. lib. ii. c. 3. Tertull. Apol. c. 12. Arnob. lib. vi. p. 202. Some of the fathers, as Tertullian, Clemens Alexandrinus, and Origen, were of opinion, that, by the second commandment, the arts of painting

and engraving were rendered unlawful to a Christian, styling them evil and wicked arts. Tert. de Idol. cap. 3. Clem. Alex. Admon. ad Gent. p. 41. Orig. contra Celsum, lib. vi. p. 182. The use of *images* in churches as ornaments, was first introduced by some Christians in Spain, in the beginning of the fourth century; but the practice was condemned as a dangerous innovation, in a council held at Eliberis in 301. Epiphanius, in a letter preserved by Jerom, tom. ii. ep. 6. bears strong testimony against *images*, and may be considered as one of the first *ICONOCLASTS*. The custom of admitting pictures of saints and martyrs into the churches (for this was the first source of *image-worship*) was rare in the latter end of the fourth century; but became common in the fifth: however, they were still considered only as ornaments; and even in this view they met with very considerable opposition. In the following century the custom of thus adorning churches became almost universal, both in the east and west. Petavius expressly says, (de Incar. lib. xv. cap. 14.) that no statues were yet allowed in the churches; because they bore too near a resemblance to the idols of the Gentiles. Towards the close of the fourth or beginning of the fifth century, *images*, which were introduced by way of ornament, and then used as an aid to devotion, began to be actually worshipped. However, it continued to be the doctrine of the church in the sixth and in the beginning of the seventh century, that *images* were to be used only as helps to devotion, and not as objects of worship. The worship of them was condemned in the strongest terms by Pope Gregory the Great; as appears by two letters of his written in 601. From this time to the beginning of the eighth century, there occurs no single instance of any worship given or allowed to be given to *images* by any council or assembly of bishops whatever. But they were commonly worshipped by the monks and populace in the beginning of the eighth century; insomuch that in the year 726, when Leo published his famous edict, it had already spread into all the provinces subject to the empire.

The Lutherans condemn the Calvinists for breaking the *images* in the churches of the Catholics, looking on it as a kind of sacrilege; and yet they condemn the Romanists (who are professed *image worshippers*) as idolaters: nor can these last keep pace with the Greeks, who go far beyond them in this point; which has occasioned abundance of disputes among them. See *ICONOCLASTS*.

The Mahometans have a perfect aversion to *images*; which was what led them to destroy most of the beautiful monuments of antiquity, both sacred and profane, at Constantinople.

IMAGE, in *Rhetoric*, signifies a lively description of any thing in a discourse. *Images*, in *discourse*, are defined by Longinus, to be, in general, any thoughts proper to produce expressions, and which present a kind of picture to the mind. But, in the more limited sense, he says, *images* are such discourses as come from us, when, by a kind of enthusiasm, or an extraordinary emotion of the soul, we seem to see the things whereof we speak, and present them before the eyes of those who hear us.

Images, in *rhetoric*, have a very different use from what they have among the poets: the end principally proposed in poetry is, astonishment and surprise; whereas the thing chiefly aimed at in prose is, to paint things naturally, and to show them clearly. They have this, however, in common, that they both tend to move, each in its kind.

These *images*, or *pictures*, are of the utmost use, to give weight, magnificence, and strength, to a discourse. They warm and animate it; and, when managed with art, according to Longinus, seem, as it were, to tame and subdue the hearer, and put him in the power of the speaker.

IMAGE, in *Optics*, a figure in the form of any object, made

by the rays of light issuing from the several points of it, and meeting in so many other points, either at the bottom of the eye, or on any other ground, or on any transparent medium, where there is no surface to reflect them. Thus we are said to see all objects by means of their images formed in the eye.

IMAGINATION, a power or faculty of the mind, whereby it conceives and forms ideas of things communicated to it by the outward organs of sense. See **METAPHYSICS**.

Force of IMAGINATION. See **MONSTER**.

IMAGO, in *Natural History*, is a name given by Linnæus to the third state of insects, when they appear in their proper shape and colours, and undergo no more transformation.

IMAM, or **IMAN**, a minister in the Mahometan church, answering to a parish priest among us. The word properly signifies what we call a prelate, *antistes*, one who presides over others; but the Mussulmen frequently apply it to a person who has the care and intendency of a mosque, who is always there at first, and reads prayers to the people, which they repeat after him.

IMAM is also applied, by way of excellence, to the four chiefs or founders of the four principal sects in the Mahometan religion. Thus Ali is the *imam* of the Persians, or of the sect of the Schiaïtes; Abu-beker the *imam* of the Sunnites, which is the sect followed by the Turks; Saphii, or Saffiy, the *imam* of another sect, &c. The Mahometans do not agree among themselves about this *imamate* or dignity of the *imam*. Some think it of divine right, and attached to a single family, as the pontificate of Aaron. Others hold, that it is indeed of divine right, but deny it to be so attached to any single family as that it may not be transferred to another. They add, that the *imam* is to be clear of all gross sins; and that otherwise he may be deposed, and his dignity may be conferred on another. However this be, it is certain, that after an *imam* has once been owned as such by the Mussulmen, he who denies that his authority comes immediately from God is accounted impious; he who does not obey him is a rebel; and he who pretends to contradict what he says is esteemed a fool, among the orthodox of that religion. The *Imams* have no outward mark of distinction; their habit is the same with that of the Turks in common, except that the turban is a little larger, and folded somewhat differently.

IMAUS, in ancient geography, the largest mountain of Asia, (Strabo); and a part of Taurus, (Pliny); from which the whole of India runs off into a vast plain, resembling Egypt. It extends far and wide through Scythia, as far as to the Mare Glaciale, dividing it into the Hither or *Scythia intra Imaum*, and into the Farther or *Scythia extra Imaum*, (Ptolemy); and also stretching out along the north of India to the eastern ocean, separates it from Scythia. It had various names according to the different countries it ran through: Postellus thinks it is the *Sephar* of Scripture.

IMBECILITY, a languid, infirm state of body, which, being greatly impaired, is not able to perform its usual exercises and functions. Imbecility may also happen to the mind, after a long attention to any abstruse subject.

IMBRICATED, is used, by some botanists, to express the figure of the leaves of some plants, which are hollowed like an *imbrex*, or gutter-tile, or are laid in close series over one another like the tiles of an house.

IMERITIA, a country of Asia, between the Black Sea and the Caspian; bounded on the S. by the Turkish dominions, on the W. by Mingrelia, on the N. by Ossétia, and on the E. by Georgia, of which it is, properly speaking, a part. The late sovereign, the czar Solomon, having forbidden the scandalous traffic of the noblemen in their peasants, offended the Turks so much, that he was driven from his throne, and compelled to live like a wild man, for 16 years, in the woods and caverns of

the mountains, till the Russians reinstated him in his dominions. The revenues arise from a contribution of the peasants in wine, grain, and cattle, and from the tribute of the neighbouring princes. Among the extraordinary sources of revenue, confiscations have a considerable share; but as all this is insufficient for the subsistence of the prince, he usually travels from house to house, living on his vassals, and never changing his quarters till he has consumed every thing eatable. It will, of course, be understood, that the court of Imeritia is not remarkable for splendour, nor the prince's table sumptuously served. His usual fare consists of gom (a species of millet, ground and boiled into a paste), a piece of roasted meat, and some pressed caviare. These he eats with his fingers; forks and spoons being unknown in Imeritia. At table he is frequently employed in judging causes, which he decides at his discretion, there being no law but his own will. He usually wears a coarse dress of a brown colour, with a musket upon his shoulder; but upon solemn occasions he puts on a robe of rich gold brocade, and hangs round his neck a silver chain. He is distinguished from his subjects by riding upon an ass, perhaps the only one in Imeritia, and by wearing boots. He has no regular troops, but can collect an undisciplined army of 6000 men, with no artillery. These troops are drawn together by the sound of trumpet. His civil ordinances are issued every Friday (which is the market day) by one of his servants, who ascends a tree, and with a loud voice proclaims the edict, which is communicated to the people, by each person, upon his return to the place of his abode. The inhabitants, estimated at about 20,000 families, are not collected into towns or villages, but scattered over the country in small hamlets. They are less mixed with foreigners, and handsomer than the other Georgians. They are likewise bolder, and more industrious: they send yearly considerable quantities of wine to the neighbouring parts of Georgia, in leathern bags, carried by horses: but they are without manufactures, very poor and miserable, and cruelly oppressed by their landlords. The Imeritians are of the Greek religion. Their patriarch is generally of the royal family, and can seldom read or write; and the inferior clergy are not better instructed. Their churches are wretched buildings, scarcely to be distinguished from common cottages, but from a paper cross over the principal door, and some paintings of the Virgin and the saints. Cutais is the capital of the present prince, the czar David.

IMITATION, derived from the Latin *imitare*, to "represent or repeat," a sound or action, either exactly or nearly in the same manner as they were originally exhibited.

IMITATION, in music, admits of two different senses. Sound and motion are either capable of imitating themselves by a repetition of their own particular modes; or of imitating other objects of a nobler and more abstracted nature. Nothing perhaps is so purely mental, nothing so remote from external sense, as not to be imitable by music.

"Dramatic or theatrical music (says M. Rousseau) contributes to imitation no less than painting or poetry: it is in this common principle that we must investigate both the origin and the final cause of all the fine arts; as M. le Batteaux has shown. But this imitation is not equally extensive in all the imitative arts. Whatever the imagination can represent to itself is in the department of poetry. Painting, which does not present its pictures to the imagination immediately, but to external sense and to one sense alone, paints only such objects as are discoverable by sight. Music might appear subjected to the same limits with respect to the ear; yet it is capable of painting every thing, even such images as are objects of ocular perception alone: by a magic almost inconceivable, it seems to transform the ears into eyes, and endow them with the double function of perceiving visible objects by the mediums of their own; and it is the greatest miracle of an art, which can only act by mo-

tion, that it can make that very motion represent absolute quiescence. Night, sleep, silence, solitude, are the noble efforts, the grand images, represented by a picturesque music. We know that noise can produce the same effect with silence, and silence the same effect with noise; as when one sleeps at a lecture insipidly and monotonically delivered, but wakes the instant when it ends. But music acts more intimately upon our spirits, in exciting by one sense dispositions similar to those which we find excited by another; and, as the relation between these images cannot be sensible unless the impression be strong, painting, when divested of this energy, cannot restore to music that assistance in imitations which she borrows from it. Though all nature should be asleep, he who contemplates her does not sleep; and the art of the musician consists in substituting, for this image of insensibility in the object, those emotions which its presence excites in the heart of the contemplator. He not only ferments and agitates the ocean, animates the flame to conflagration, makes the fountain murmur in his harmony, calls the rattling shower from heaven, and swells the torrent to restless rage; but he paints the horrors of a boundless and frightful desert, involves the subterranean dungeon in tenfold gloom, soothes the tempest, tranquillizes the disturbed elements, and from the orchestra diffuses a recent fragrance through imaginary groves; nay, he excites in the soul the same emotions which we feel from the immediate perception and full influence of these objects."

Under the word *Harmony*, Rousseau has said, that no assistance can be drawn from thence, no original principle which leads to musical imitation; since there cannot be any relation between chords and the objects which the composer would paint, or the passions which he would express. In the article *Melody*, he imagines he has discovered that principle of imitation which harmony cannot yield, and what resources of nature are employed by music in representing these objects and these passions. To this, however, many objections might be urged.

"Imitation (continues Rousseau), in its technical sense, is a reiteration of the same air, or of one which is similar, in several parts where it is repeated by one after the other, either in unison, or at the distance of a fourth, a fifth, a third, or any other interval whatever. The imitation may be happily enough pursued even though several notes should be changed; provided the same air may always be recognised, and that the composer does not deviate from the laws of proper modulation. Frequently, in order to render the imitation more sensible, it is preceded by a general rest, or by long notes which seem to obliterate the impression formerly made by the air till it is renewed with greater force and vivacity by the commencement of the imitation. The imitation may be treated as the composer chooses; it may be abandoned, resumed, or another begun, at pleasure; in a word, its rules are as much relaxed as those of the fugue are severe: for this reason, it is despised by the most eminent masters; and every imitation of this kind too much affected, almost always betrays a novice in composition."

IMITATION, in oratory, is an endeavour to resemble a speaker or writer in those qualities with regard to which we propose them to ourselves as patterns. The first historians among the Romans, says Cicero, were very dry and jejune, till they began to imitate the Greeks, and then they became their rivals. It is well known how closely Virgil has imitated Homer in his *Æneid*, Hesiod in his *Georgics*, and Theocritus in his *Eclogues*. Terence copied after Menander; and Plautus after Epicarmus, as we learn from Horace, lib. ii. Ep. ad August. who himself owes many of his beauties to the Greek lyric poets. Cicero appears, from many passages in his writings, to have imitated the Greek orators. Thus Quintilian says of him, that he has expressed the strength and sublimity of Demosthenes, the copiousness of Plato, and the delicacy of Isocrates.

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IMMACULATE, something without stain, chiefly applied to the conception of the holy Virgin. See *Immaculate CONCEPTION*.

IMMATERIAL, something devoid of matter, or that is pure spirit. See *METAPHYSICS*.

IMMEMORIAL, an epithet given to the time or duration of any thing whose beginning we know nothing of. In a legal sense, a thing is said to be of *time immemorial*, or *time out of mind*, that was before the reign of our king Edward II.

IMMER, the most easterly island of all the New Hebrides in the South Sea. It lies about four leagues from Tanna, and seems to be about five leagues in circumference; it is of a considerable height, with a flat top.

IMMERETTA, or IMERITIA. See *IMERITIA*.

IMMERISION, in astronomy, is when a star or planet is so near the sun with regard to our observations, that we cannot see it; being, as it were, enveloped and hid in the rays of that luminary. It also denotes the beginning of an eclipse of the moon, or that moment when the moon begins to be darkened, and to enter into the shadow of the earth.

IMMOLATION, a ceremony used in the Roman sacrifices; in consisted in throwing upon the head of the victim some sort of corn and frankincense, together with the *mola*, or salt cake, and a little wine.

IMMUNITY, a privilege or exemption from some office, duty, or imposition, as an exemption from tolls, &c. Immunity is more particularly understood of the liberties granted to cities and communities.

IMOLA, a populous town of Italy, in Romagna, with a bishop's see; seated on the river Santerno, 45 miles N. by E. of Florence. E. lon. 11. 45. N. lat. 44. 28.

IMPALE, in heraldry, is to conjoin two coats of arms pale-wise. Women impale their coats of arms with those of their husbands. See *HERALDRY*. To impale cities, camps, fortifications, &c. is to inclose them with palisadoes.

To IMPALE, or *Empale*, signifies also to put to death by spitting a criminal on a stake fixed upright.

IMPANATION, a term used by divines to signify the opinion of the Lutherans with regard to the eucharist, who believe that the species of bread and wine remain together with the body of our Saviour after consecration.

IMPANNELLING, in law, signifies the writing down or entering into a parchment, list, or schedule, the names of a jury summoned by the sheriff to appear for such public services as juries are employed in.

IMPARLANCE, in law, a petition in court for a day to consider or advise what answer the defendant shall make to the plaintiff's action; and is the continuance of the cause till another day, or a longer time given by the court.

IMPASSIBLE, that which is exempt from suffering; or which cannot undergo pain, or alteration. The Stoics place the soul of their wise man in an impassible, imperturbable state. See *APATHY*.

IMPASTATION, the mixture of various materials of different colours and consistencies, baked or bound together with some cement, and hardened either by the air or by fire.

IMPATIENS, TOUCH-ME-NOT, and *Balsamine*. See *BALSAMINE*.

IMPEACHMENT, an accusation and prosecution for treason and other crimes and misdemeanors. Any member of the lower house of parliament may impeach any one belonging either to that body or to the house of lords. The method of proceeding is to exhibit articles on the behalf of the commons, by whom managers are appointed to make good their charge. These articles are carried to the lords, by whom every person impeached by the commons is always tried; and if they find

him guilty, no pardon under the great seal can be pleaded to such an impeachment. 12 Will. III. cap. ii.

IMPECCABILES, in church history, a name given to those heretics who boasted that they were impeccable, and that there was no need of repentance: such were the Gnostics, Priscillianists, &c.

IMPECCABILITY, the state of a person who cannot sin: or a grace, privilege, or principle, which puts him out of a possibility of sinning. The schoolmen distinguish several kinds and degrees of impeccability: that of God belongs to him by nature: that of Jesus Christ, considered as man, belongs to him by the hypostatical union: that of the blessed is a consequence of their condition: that of men is the effect of a confirmation in grace, and is rather called *impeccance* than *impeccability*: accordingly divines distinguish between these two: this distinction is found necessary in the disputes against the Pelagians, in order to explain certain terms in the Greek and Latin fathers, which without this distinction are easily confounded.

IMPEDIMENTS, in law, are such hindrances as put a stop or stay to a person's seeking for his right by a due course of law. Persons under impediments are those under age or coverture, *non compos mentis*, in prison, beyond sea, &c. who, by a saving in our laws, have time to claim and prosecute their rights, after the impediments are removed, in case of fines levied, &c.

IMPENETRABILITY, in philosophy, that property of body, whereby it cannot be pierced by another: thus, a body which so fills a space as to exclude all others, is said to be impenetrable.

IMPERATIVE, one of the moods of a verb, used when we would command, entreat, or advise: thus, *go read, take pity, be advised*, are imperatives in our language. But in the learned languages this mood has a peculiar termination to distinguish it from others, as *i*, or *ito*, "go;" *lege*, or *legito*, "read," &c. and not only so, but the termination varies, according as you address one or more persons, as *audi* and *audite*; *αγγελω*, *αγγελων*, *αγγελωσαν*, &c.

IMPERATOR, in Roman antiquity, a title of honour conferred on victorious generals by their armies, and afterwards confirmed by the senate. *Imperator* was also the title adopted by the Roman emperors.

IMPERATORIA, MASTERWORT; a genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order *Umbellatæ*. The fruit is roundish, compressed in the middle, gibbous, and surrounded with a border; the petals are inflexo-emarginated. There is but one species, *viz.* the ostruthium, a native of the Austrian and Styrian Alps, and other mountainous places of Italy. Mr. Lightfoot informs us, that he has found it in several places on the banks of the Clyde in Scotland; but whether indigenous or not, is uncertain. The root is as thick as a man's thumb, running obliquely in the ground; it is fleshy, aromatic, and has a strong acrid taste, biting the tongue like pellitory of Spain: the leaves arise immediately from the root; they have long foot-stalks, dividing into three very short ones at the top, each sustaining a trilobate leaf indented on the border. The footstalks are deeply channelled, and, when broken, emit a rank odour. The flower-stalks rise about two feet high, dividing into two or three branches, each being terminated by a pretty large umbel of white flowers whose petals are split; these are succeeded by oval compressed seeds, somewhat like those of dill, but larger. The plant is cultivated in gardens for the sake of its roots, which are used in medicine. It may be propagated either by seeds, or by parting the roots in autumn. They thrive best in a shady situation. The root has a flavour similar to that of angelica, and is esteemed a good sudorific. There are instances of its having cured the ague when the bark had failed. It should be dug up in winter, and a strong infusion made in wine.

IMPERFECT TENSE, in grammar, a tense that denotes some preterite case, or denotes the thing to be at that time present, and not quite finished; as *scribebam*, "I was writing." See GRAMMAR.

IMPERIAL, something belonging to an emperor, or empire. See EMPEROR and EMPIRE. Thus we say, his *imperial* majesty, the *imperial* crown, an *imperial* city, &c.

IMPERIAL Crown. See HERALDRY, p. 216.

IMPERIAL Chamber, is a sovereign court, established for the affairs of the immediate states of the Empire. See CHAMBER and GERMANY.

IMPERIAL Cities, in Germany, are those which own no other head but the Emperor. These are a kind of little commonwealths; the chief magistrate whereof does homage to the emperor, but in other respects, and in the administration of justice, is sovereign. Imperial cities have a right of coining money, and of keeping forces and fortified places. Their deputies assist at the imperial diets, where they are divided into two branches, that of the Rhine and that of Suabia. There were formerly 22 in the former, and 37 in the latter; but there are now only 48 in all.

IMPERIAL Diet, is an assembly or convention of all the states of the Empire. See DIET and GERMANY.

IMPERIALI (JOHN BAPTIST), a celebrated physician of Vicenza, where he was born in 1568. He composed several esteemed works both in prose and verse, written in good Latin; and died in 1623.

IMPERSONAL VERB, in grammar, a verb to which the nominative of any certain person cannot be prefixed; or, as others define it, a verb destitute of the two first and primary persons, as *decet*, *oportet*, &c. The impersonal verbs of the active voice end in *t*, and those of the passive in *tur*; they are conjugated through the third person singular of almost all the tenses and moods: they want the imperative, instead of which we use the present of the subjunctive; as *paniteat*, *pugnetur*, &c. nor, but a few excepted, are they to be met with in the supines, participles, or gerunds.

IMPETIGO, in Surgery, an extreme roughness and foulness of the skin, attended with an itching and plentiful eruption. The *impetigo* is a species of dry pruriginous itch, wherein scales or scurf appear on the skin, of which, strictly speaking, it is a disease, though connected with a peculiar state of the constitution. For the cure, both internal and external means must be adopted.

IMPETRATION, the act of obtaining any thing by request or prayer. This term, however, was more particularly used in our statutes for the pre-obtaining of benefices and church-offices in England from the court of Rome, which did belong to the disposal of the king and other lay-patrons of the realm; the penalty whereof is the same with that of provisors, 25 Edw. III.

IMPETUS, in mechanics, the force with which one body strikes or impels another.

IMPLICATION, in law, is where something is implied that is not expressed by the parties themselves in their deeds, contracts, or agreements.

To IMPLY, or CARRY, in Music. Authors have used these as synonymous terms in music. They are intended to signify those sounds which ought to be the proper concomitants of any note, whether by its own nature, or by its position in artificial harmony. Thus every note, considered as an independent sound, may be said to *carry* or *imply* its natural harmonics, that is to say, its octave, its twelfth, and its seventeenth; or, when reduced, its eighth, its fifth, and its third. But the same sound, when considered as constituting any part of harmony, is subjected to other laws and different limitations. It can then only be said to *carry* or *imply* such simple sounds, or complications.

of sound, as the preceding and subsequent chords admit or require. For these the laws of melody and harmony must be consulted. See MELODY and HARMONY.

IMPORTATION, in commerce, the bringing merchandise into a kingdom from foreign countries; in contradistinction to exportation. See EXPORTATION. Respecting the laws which relate to importation, see *Custom-house* LAWS.

IMPOSITION of hands, an ecclesiastical action by which a bishop lays his hand on the head of a person, in ordination, confirmation, or in uttering a blessing. This practice is also frequently observed by the dissenters at the ordination of their ministers, when all the ministers present place their hands on the head of him whom they are ordaining, while one of them prays for a blessing on him and his future labours. This some of them retain as an ancient practice, justified by the example of the apostles, when no extraordinary gifts are conveyed. However, they are not agreed as to the propriety of this ceremony; nor do they consider it as an essential part of ordination. Imposition of hands was a Jewish ceremony, introduced not by any divine authority, but by custom; it being the practice among those people, whenever they prayed to God for any person, to lay their hands on his head. Our Saviour observed the same custom, both when he conferred his blessing on children and when he cured the sick; adding prayer to the ceremony. The apostles likewise laid hands on those upon whom they bestowed the Holy Ghost. The priests observed the same custom when any one was received into their body. And the apostles themselves underwent the imposition of hands afresh every time they entered upon any new design. In the ancient church, imposition of hands was even practised on persons when they married, which custom the Abyssinians still observe.

IMPOSSIBLE, that which is not possible, or which cannot be done or effected. A proposition is said to be impossible, when it contains two ideas which mutually destroy each other, and which can neither be conceived nor united together. Thus it is impossible that a circle should be a square; because we conceive clearly that squareness and roundness destroy each other by the contrariety of their figure. There are two kinds of impossibilities, *physical* and *moral*. Physical impossibility is that which is contrary to the law of nature. A thing is morally impossible, when of its own nature it is possible, but yet is attended with such difficulties, as that, all things considered, it appears impossible. Thus it is morally impossible that all men should be virtuous; or that a man should throw the same number with three dice a hundred times successively. A thing which is impossible in law, is the same with a thing impossible in nature: and if any thing in a bond or deed be impossible to be done, such deed, &c. is void. 21 Car. I.

IMPOST, in law, signifies in general a tribute or custom, but is more particularly applied to signify that tax which the crown receives for merchandizes imported into any port or haven.

IMPOSTHUME, or abscess, a collection of matter or pus in any part of the body, either owing to previous inflammation in that part, or to a translocation of it from some other part. See SURGERY.

IMPOSTOR, in a general sense, denotes a person who cheats by a fictitious character. Thus, *religious impostors* are such as falsely pretend to an extraordinary commission from heaven; and who terrify and abuse the people with false denunciations of judgements. These are punishable in the temporal courts with fine, imprisonment, and infamous corporal punishment.

IMPOTENCE, or IMPOTENCY, in general, denotes want of strength, power, or means, to perform any thing.

Divines and philosophers distinguish two sorts of impotency; natural and moral. The first is a want of some physical princi-

ple, necessary to an action; or where a being is absolutely defective, or not free and at liberty to act: The second only imports a great difficulty; as a strong habit to the contrary, a violent passion, or the like.

IMPOTENCY is a term more particularly used for an inability to coition. Impotence with respect to men is the same as sterility in women, that is, an inability of propagating the species. There are many causes of impotence; as, a natural defect in the organs of generation, which seldom admits of a cure: accidents or diseases; and in such cases the impotence may or may not be remedied, according as these are curable or otherwise. The most common causes, and almost the only, are, early and immoderate venery, or the practice of masturbation in youth. We have instances, however, of unfitness for generation in men by an impediment to the ejection of the semen in coition, from a wrong direction which the orifice at the *verumontanum* got, whereby the seed was thrown up into the bladder. M. Petit cured one patient under such a difficulty of emission, by making an incision like to that commonly made in the great operation for the stone.

On this subject we have some curious and original observations by the late Mr. John Hunter in his Treatise on the Venereal Disease. He considers impotency as depending upon two causes. One he refers to the mind; the other to the organs.

1. *As to impotency depending upon the mind*, he observes, that as the "parts of generation are not necessary for the existence or support of the individual, but have a reference to something else in which the mind has a principal concern; so a complete action in those parts cannot take place without a perfect harmony of body and of mind: that is, there must be both a power of body and disposition of mind; for the mind is subject to a thousand caprices, which affect the actions of these parts.

"Copulation is an act of the body, the spring of which is in the mind; but it is not volition: and according to the state of the mind, so is the act performed. To perform this act well, the body should be in health, and the mind should be perfectly confident of the powers of the body: the mind should be in a state entirely disengaged from every thing else: it should have no difficulties, no fears, no apprehensions, not even an anxiety to perform the act well; for even this anxiety is a state of mind different from what should prevail; there should not be even a fear that the mind itself may find a difficulty at the time the act should be performed. Perhaps no function of the machine depends so much upon the state of the mind as this.

"The will and reasoning faculty have nothing to do with this power; they are only employed in the act, so far as voluntary parts are made use of: and if they ever interfere, which they sometimes do, it often produces another state of mind which destroys that which is proper for the performance of the act; it produces a desire, a wish, a hope, which are all only diffidence and uncertainty, and create in the mind the idea of a possibility of the want of success, which destroys the proper state of mind, or necessary confidence.

"There is perhaps no act in which a man feels himself more interested, or is more anxious to perform well; his pride being engaged in some degree, which if within certain bounds would produce a degree of perfection in an act depending upon the will, or an act in voluntary parts; but when it produces a state of mind contrary to that state on which the perfection of the act depends, a failure must be the consequence.

"The body is not only rendered incapable of performing this act by the mind being under the above influence, but also by the mind being, though perfectly confident of its power, yet conscious of an impropriety in performing it: this, in many cases, produces a state of mind which shall take away all power. The state of a man's mind respecting his sister takes away all power. A conscientious man has been known to lose his powers

on finding the woman he was going to be connected with unexpectedly a virgin.

"Shedding tears arises entirely from the state of the mind, although not so much a compound action as the act in question; for none are so weak in body that they cannot shed tears; it is not so much a compound action of the mind and strength of body joined, as the other act is; yet if we are afraid of shedding tears, or are desirous of doing it, and that anxiety is kept up through the whole of an affecting scene, we certainly shall not shed tears, or at least not so freely as would have happened from our natural feelings.

"From this account of the necessity of having the mind independent respecting the act, we must see that it may very often happen that the state of mind will be such as not to allow the animal to exert its natural powers; and every failure increases the evil. We must also see, from this state of the case, that this act must be often interrupted; and the true cause of this interruption not being known, it will be laid to the charge of the body, or want of powers. As these cases do not arise from real inability, they are to be carefully distinguished from such as do; and perhaps the only way to distinguish them is, to examine into the state of mind respecting this act. So trifling often is the circumstance which shall produce this inability depending on the mind, that the very desire to please shall have that effect, as in making the woman the sole object to be gratified.

"Cases of this kind we see every day; one of which I shall relate as an illustration of this subject, and also of the method of cure. A gentleman told me, that he had lost his virility. After above an hour's investigation of the case, I made out the following facts: that he had at unnecessary times strong erections, which showed that he had naturally this power; that the erections were accompanied with desire, which are all the natural powers wanted; but that there was still a defect somewhere, which I supposed to be from the mind. I inquired if all women were alike to him? His answer was, No; some women he could have connection with as well as ever. This brought the defect, whatever it was, into a smaller compass: and it appeared there was but one woman that produced this inability, and that it arose from a desire to perform the act with this woman well: which desire produced in the mind a doubt or fear of the want of success, which was the cause of the inability of performing the act. As this arose entirely from the state of the mind produced by a particular circumstance, the mind was to be applied to for the cure; and I told him that he might be cured, if he could perfectly rely on his own power of self-denial. When I explained what I meant, he told me that he could depend upon every act of his will or resolution. I then told him, that if he had a perfect confidence in himself in that respect, he was to go to bed to this woman, but first promise to himself that he would not have any connection with her for six nights, let his inclinations and powers be what they would; which he engaged to do, and also to let me know the result. About a fortnight after he told me, that this resolution had produced such a total alteration in the state of his mind, that the power soon took place; for, instead of going to bed with the fear of inability, he went with fears that he should be possessed with too much desire, too much power, so as to become uneasy to him: which really happened; for he would have been happy to have shortened the time; and when he had once broke the spell, the mind and powers went on together, and his mind never returned to its former state."

2. *Of impotency from a want of proper correspondence between the actions of the different organs.*—Our author, in a former part of his Treatise, when considering the diseases of the urethra and bladder, had remarked, that every organ in an animal body, without exception, was made up of different parts, whose functions or actions were totally different from one another, al-

though all tending to produce one ultimate effect. In all such organs when perfect (he observes), there is a succession of motions, one naturally arising out of the other, which in the end produces the ultimate effect; and an irregularity alone in these actions will constitute disease, at least will produce very disagreeable effects, and often totally frustrate the intention of the organ. This principle Mr. Hunter, on the present occasion, applies to the "actions of the testicles and penis: for we find that an irregularity in the actions of these parts sometimes happens in men, producing impotence; and something similar probably may be one cause of barrenness in women.

"In men, the parts subservient to generation may be divided into two; the essential, and the accessory. The testicles are the essential; the penis, &c. the accessory. As this division arises from their uses or actions in health, which exactly correspond with one another, a want of exactness in the correspondence or susceptibility of those actions may also be divided into two: where the actions are reversed, the accessory taking place without the first or essential, as in erections of the penis where neither the mind nor the testicles are stimulated to action; and the second is where the testicles perform the action of secretion too readily for the penis, which has not a corresponding erection. The first is called *priapism*; and the second is what ought to be called *seminal weakness*.

"The mind has considerable effect on the correspondence of the actions of these two parts: but it would appear in many instances, that erections of the penis depend more on the state of the mind than the secretion of the semen does; for many have the secretion, but not the erection; but in such, the want of erection appears to be owing to the mind only.

"Priapism often arises spontaneously; and often from visible irritation of the penis, as in the venereal gonorrhœa, especially when violent. The sensation of such erections is rather uneasy than pleasant; nor is the sensation of the glans at the time similar to that arising from the erections of desire, but more like to the sensation of the parts immediately after coition. Such as arise spontaneously are of more serious consequence than those from inflammation, as they proceed probably from causes not curable in themselves or by any known methods. The priapism arising from inflammation of the parts, as in a gonorrhœa, is attended with nearly the same symptoms; but generally the sensation is that of pain, proceeding from the inflammation of the parts. It may be observed, that what is said of priapism is only applicable to it when a disease in itself, and not when a symptom of other diseases, which is frequently the case.

"The common practice in the cure of this complaint is to order all the nervous and strengthening medicines; such as bark, valerian, musk, camphor, and also the cold bath. I have seen good effects from the cold bath; but sometimes it does not agree with the constitution, in which case I have found the warm bath of service. Opium appears to be a specific in many cases; from which circumstance I should be apt, upon the whole, to try a soothing plan.

"Seminal weakness, or a secretion and emission of the semen without erections, is the reverse of a priapism, and is by much the worst disease of the two. There is great variety in the degrees of this disease, there being all the gradations from the exact correspondence of the actions of all the parts to the testicles acting alone; in every case of the disease, there is too quick a secretion and evacuation of the semen. Like to the priapism, it does not arise from desires and abilities; although when mild it is attended with both, but not in a due proportion; a very slight desire often producing the full effect. The secretion of the semen shall be so quick, that simple thought, or even toying, shall make it flow.

"Dreams have produced this evacuation repeatedly in the same night; and even when the dreams have been so slight, that there has been no consciousness of them when the sleep has been bro-

ken by the act of emission. I have known cases where the testicles have been so ready to secrete, that the least friction on the glans has produced an emission: I have known the simple action of walking or riding produce this effect, and that repeatedly in a very short space of time.

"A young man, about four or five and twenty years of age, not so much given to venery as most young men, had these last-mentioned complaints upon him. Three or four times in the night he would emit; and if he walked fast, or rode on horseback, the same thing would happen. He could scarcely have connection with a woman before he emitted, and in the emission there was hardly any spasm. He tried every supposed strengthening medicine, as also the cold bath and sea-bathing, but with no effect. By taking 20 drops of laudanum on going to bed, he prevented the night emissions; and by taking the same quantity in the morning, he could walk or ride without the before-mentioned inconvenience. I directed this practice to be continued for some time, although the disease did not return, that the parts might be accustomed to this healthy state of action; and I have reason to believe the gentleman is now well. It was found necessary, as the constitution became more habituated to the opiate, to increase the dose of it.

"The spasms, upon the evacuation of the semen in such cases, are extremely slight, and a repetition of them soon takes place; the first emission not preventing a second; the constitution being all the time but little affected*. When the testicles act alone, without the accessory parts taking up the necessary and natural consequent action, it is still a more melancholy disease; for the secretion arises from no visible or sensible cause, and does not give any visible or sensible effect, but runs off similar to involuntary stools or urine. It has been observed that the semen is more fluid than natural in some of these cases.

"There is great variety in the diseased actions of these parts; of which the following case may be considered as an example: A gentleman has had a stricture in the urethra for many years, for which he has frequently used a bougie, but of late has neglected it. He has had no connection with women for a considerable time, being afraid of the consequences. He has often in his sleep involuntary emissions, which generally awake him at the paroxysm; but what surprises him most is, that often he has such without any semen passing forwards through the penis, which makes him think that at those times it goes backwards into the bladder. This is not always the case, for at other times the semen passes forwards. At the time the semen seems to pass into the bladder, he has the erection, the dream; and is awaked with the same mode of action, the same sensation, and the same pleasure, as when it passes through the urethra, whether dreaming or waking. My opinion is, that the same irritation takes place in the bulb of the urethra without the semen, that takes place there when the semen enters, in consequence of all the natural preparatory steps, whereby the very same actions are excited as if it came into the passage: from which one would suppose, that either semen is not secreted; or, if it be, that a retrograde motion takes place in the actions of the acceleratores urinae. But if the first be the case, then we may suppose, that in the natural state the actions of those muscles do not arise simply from the stimulus of the semen in the part, but from their action being a termination of a preceding one making part of a series of actions. Thus they may depend upon the friction, or the imagination of a friction, on the penis; the testicles not doing their part, and the spasm in such cases arising from the friction and not from the secretion. In many of those cases of irregularity, when the erection is not strong, it shall go off with-

out the emission; and at other times an emission shall happen almost without an erection; but these arise not from debility, but affections of the mind.

"In many of the preceding cases, washing the penis, scrotum, and perineum, with cold water, is often of service; and to render it colder than we find it in some seasons of the year, common salt may be added to it, and the parts washed when the salt is almost dissolved."

IMPOTENCY is a canonical disability, to avoid marriage in the spiritual court. The marriage is not void *ab initio*, but voidable only by sentence of separation during the life of the parties.

IMPRECATION, derived from *in*, and *precor* "I pray;" a curse, or wish that some evil may befall any one. The ancients had their goddesses called *Imprecations*, in Latin *Diræ*, i. e. *Deorum iræ*, who were supposed to be the executioners of evil consciences. They were called *Diræ* in heaven, *Furies* on earth, and *Eumenides* in hell. The Romans owned but three of these *Imprecations*, and the Greeks only two. They invoked them with prayers and pieces of verses to destroy their enemies.

IMPREGNATION, the getting a female with child. See MIDWIFERY; and ANATOMY, p. 208 and 209. The term *impregnation* is also used in pharmacy, for communicating the virtues of one medicine to another, whether by mixture, cotion, digestion, &c.

IMPRESSING SEAMEN. The power of impressing sea-faring men for the sea-service by the king's commission, has been a matter of some dispute, and submitted to with great reluctance; though it hath very clearly and learnedly been shown by Sir Michael Foster, that the practice of impressing, and granting powers to the admiralty for that purpose, is of very ancient date, and hath been uniformly continued by a regular series of precedents to the present time: whence he concludes it to be part of the common law. The difficulty arises from hence, that no statute has expressly declared this power to be in the crown, though many of them very strongly imply it. The statute 2 Ric. II. c. 4. speaks of mariners being arrested and retained for the king's service, as of a thing well known, and practised without dispute; and provides a remedy against their running away. By a later statute, if any waterman, who uses the river Thames, shall hide himself during the execution of any commission of pressing for the king's service, he is liable to heavy penalties. By another (5 Eliz. c. 5.) no fisherman shall be taken by the queen's commission to serve as a mariner; but the commission shall be first brought to two justices of the peace, inhabiting near the sea-coast where the mariners are to be taken, to the intent that the justices may choose out and return such a number of able-bodied men, as in the commission are contained, to serve her majesty. And by others, especial protections are allowed to seamen in particular circumstances, to prevent them from being impressed. Ferry-men are also said to be privileged from being impressed, at common law. All which do most evidently imply a power of impressing to reside somewhere; and if any where, it must, from the spirit of our constitution, as well as from the frequent mention of the king's commission, reside in the crown alone.—After all, however, this method of manning the navy is to be considered as only defensible from public necessity, to which all private considerations must give way.

The following persons are exempted from being impressed: Apprentices for three years; the master, mate, and carpenter, and one man for every 100 tons, of vessels employed in the coal trade; all under 18 years of age, and above 55; foreigners in merchant ships and privateers; landmen betaking themselves to sea for two years; seamen in the Greenland fishery, and har-

* "It is to be considered, that the constitution is commonly affected by the spasms only, and in proportion to their violence, independent of the secretion and evacuation of the semen. But in some cases even the erection going off without the spasms on the emission, shall produce the same debility as if they had taken place."

pooners, employed, during the interval of the fishing season, in the coal-trade, and giving security to go to the fishing next season.

IMPRESSION is applied to the species of objects which are supposed to make some mark or impression on the senses, the mind, and the memory. The Peripatetics assert, that bodies emit species resembling them, which are conveyed to the common *sensorium*, and they are rendered intelligible by the active intellect; and, when thus spiritualized, are called *expressions*, or *express species*, as being expressed from the others.

IMPRESSION also denotes the *edition* of a book, regarding the mechanical part only; whereas *edition*, besides this, takes in the care of the editor who corrected or augmented the copy, adding notes, &c. to render the work more useful.

IMPRISONMENT, the state of a person restrained of his liberty, and detained under the custody of another. No person is to be imprisoned but as the law directs, either by the command or order of a court of record, or by lawful warrant; or the king's process, on which one may be lawfully detained. And at common law, a person could not be imprisoned unless he were guilty of some force and violence, for which his body was subject to imprisonment, as one of the highest executions. Where the law gives power to imprison, in such case it is justifiable, provided he that does it in pursuance of a statute exactly pursues the statute in the manner of doing it; for otherwise it will be deemed false imprisonment, and of consequence it is unjustifiable. Every warrant of commitment for imprisoning a person ought to run, "till delivered by due course of law," and not "until farther order;" which has been held ill: and thus it also is, where one is imprisoned on a warrant not mentioning any cause for which he is committed. See **ARREST** and **COMMITMENT**.

False IMPRISONMENT. Every confinement of the person is an imprisonment, whether it be in a common prison, or in a private house, or in the stocks, or even by forcibly detaining one in the public streets. Unlawful or *false imprisonment* consists in such confinement or detention without sufficient authority: which authority may arise either from some process from the courts of justice; or from some warrant from a legal power to commit, under his hand and seal, and expressing the cause of such commitment; or from some other special cause warranted, for the necessity of the thing, either by common law or act of parliament: such as the arresting of a felon by a private person without warrant, the impressing of mariners for misbehaviour in the public highways. False imprisonment also may arise by executing a lawful warrant or process at an unlawful time, as on a Sunday; or in a place privileged from arrests, as in the verge of the king's court. This is the injury. The remedy is of two sorts; the one removing the injury, the other making satisfaction for it.

The means of removing the actual injury of false imprisonment are four-fold, 1. By writ of **MAINPRIZE**. 2. By writ *De ODIO et Atia*. 3. By writ *De HOMINE Replegiando*. 4. By writ of **HABEAS Corpus**. See those articles.

The *satisfactory* remedy for this injury for false imprisonment is by an action of trespass *vi et armis*, usually called an *action of false imprisonment*; which is generally, and almost unavoidably, accompanied with a charge of assault and battery also: and therein the party shall recover damages for the injuries he has received; and also the defendant is, as for all other injuries committed with force, or *vi et armis*, liable to pay a fine to the king for the violation of the public peace.

IMPROMPTU, or **IMPROMPTU**, a Latin word frequently used among the French, and sometimes in English, to signify a piece made off-hand, or *extempore*, without any previous meditation, by more force and vivacity of imagination.

IMPROPRIATION, in ecclesiastical law. See **APPROPRIATION**.

IMPURITY, in the law of Moses, is any legal defilement.

Of these there were several sorts. Some were voluntary, as the touching a dead body, or any animal that died of itself, or any creature that was esteemed unclean; or the touching things holy by one who was not clean, or was not a priest; the touching one who had a leprosy, one who had a gonorrhœa, or who was polluted by a dead carcase, &c. Sometimes these impurities were involuntary; as when any one inadvertently touched bones, or a sepulchre, or any thing polluted; or fell into such diseases as pollute, as the leprosy, &c.

The beds, clothes, and moveables, which had touched any thing unclean, contracted also a kind of impurity, and in some cases communicated it to others. These legal pollutions were generally removed by bathing, and lasted no longer than the evening. The person polluted plunged over head in the water, and either had his clothes on when he did so, or washed himself and his clothes separately. Other pollutions continued seven days, as that which was contracted by touching a dead body. That of women in their monthly courses lasted till this was over with them. Other impurities lasted 40 or 50 days; as that of women who were recently delivered, who were unclean 40 days after the birth of a boy, and 50 after the birth of a girl. Others again lasted till the person was cured.

Many of these pollutions were expiated by sacrifices; and others by a certain water or lye made with the ashes of a red heifer, sacrificed on the great day of expiation. When the leper was cured, he went to the temple, and offered a sacrifice of two birds, one of which was killed and the other set at liberty. He who had touched a dead body, or had been present at a funeral, was to be purified with the water of expiation, and this upon pain of death. The woman who had been delivered, offered a turtle and a lamb for her expiation; or, if she was poor, two turtles or two young pigeons.

These impurities, which the law of Moses has expressed with the greatest accuracy and care, were only figures of other more important impurities, such as the sins and iniquities committed against God, or faults committed against our neighbour. The saints and prophets of the Old Testament were sensible of this; and our Saviour, in the gospel, has strongly inculcated, that they are not outward and corporeal pollutions which render us unacceptable to God, but such inward pollutions as infect the soul, and are violations of justice, truth, and charity.

INALIENABLE, that which cannot be legally alienated or made over to another: thus the dominions of the king, the revenues of the church, the estates of a minor, &c. are inalienable, otherwise than with a reserve of the right of redemption.

INANITION, among physicians, denotes the state of the stomach when empty, in opposition to repletion.

INANITY, the school term for emptiness or absolute vacuity, and implies the absence of all body and matter whatsoever, so that nothing remains but mere space.

INARCHING, in gardening, is a method of grafting, commonly called *grafting by approach*; and is used when the stock intended to graft on, and the tree from which the graft is to be taken, stand so near, or can be brought so near, that they may be joined together. The branch to be inarched is to be fitted to that part of the stock where it is to be joined; the rind and wood are to be pared away on one side for the length of three inches, and the stock or branch where the graft is to be united must be served in the same manner, so that the two may join equally and the sap meet. A little tongue is then to be cut upwards in the graft, and a notch made in the stock to admit it; so that when they are joined, the tongue will prevent their slipping, and the graft will more closely unite to the stock. Having thus brought them exactly together, they must be tied with some bafs, or worsted, or other soft tying: and then the place must be covered with some grafting clay, to prevent the air from drying the wound, and the wet from rotting the stock. A stake must be

fixed in the ground, to which both the stock and the graft must be tied to prevent the winds from displacing them. When they have remained in this state for four months, they will be sufficiently united, and the graft may then be cut off from the mother-tree, observing to slope it close to the stock; and at this time there should be fresh clay laid all round the part. This operation should be performed in April or May, that the graft may be perfectly united to the stock before the ensuing winter. Inarching is chiefly practised upon oranges, myrtles, jessamines, walnuts, firs, and some other trees which do not succeed well in the common way of grafting. But it is a wrong practice when orange-trees are designed to grow large, for these are seldom long-lived after the operation.

INAUGURATION, the coronation of an emperor or king, or the consecration of a prelate: so called from the ceremonies used by the Romans when they were received into the college of augurs.

INCA, or **YACA**, a name given by the natives of Peru to their kings and the princes of the blood. Pedro de Cieca, in his Chronicles of Peru, gives the origin of the incas; and says, that that country was for a long time the theatre of all manner of crimes, of war, dissension, and the most dreadful disorders, till at last two brothers appeared, one of whom was called *Mangorapa*. Of this person the Peruvians relate many wonderful stories. He built the city of Cusco, made laws, established order and harmony by his wise regulations; and he and his descendants took the name of *inca*, which signifies king or great lord. These incas became so powerful, that they rendered themselves masters of all the country from Pasto to Chili, and from the river Maule on the south to the river Augasmagu on the north; these two rivers forming the bounds of their empire, which extended above thirteen hundred leagues in length. This they enjoyed till the divisions between Inca Guascar and Atabalipa; which the Spaniards laying hold of, made themselves masters of the country, and destroyed the empire of the incas.

INCAMERATION, a term used in the chancery of Rome, for the uniting of lands, revenues, or other rights, to the pope's domain.

INCANTATION, denotes certain ceremonies, accompanied with a formula of words, and supposed to be capable of raising devils, spirits, &c. See **CHARM**, &c.

INCAPACITY, in the canon-law, is of two kinds: 1. The want of a dispensation for age in a minor, for legitimization in a bastard, and the like: this renders the provision of a benefice void in its original. 2. Crimes and heinous offences, which annul provisions at first valid.

INCARNATION, in theology, signifies the act whereby the Son of God assumed the human nature; or the mystery by which Jesus Christ, the eternal word, was made man, in order to accomplish the work of our salvation. The era used among Christians, whence they number their years, is the time of the incarnation, that is, of Christ's conception in the virgin's womb. This era was first established by Dionysius Exiguus, about the beginning of the sixth century, till which time the era of Diocletian had been in use. Some time after this, it was considered, that the years of a man's life were not numbered from the time of his conception, but from that of his birth: which occasioned them to postpone the beginning of this era for the space of one year, retaining the cycle of Dionysius entire in every thing else. At Rome they reckon their years from the incarnation or birth of Christ, that is, from the 25th of December, which custom has obtained from the year 1431. In France, and several other countries, they also reckon from the incarnation: but then they differ from each other in the day of the incarnation, fixing it, after the primitive manner, not to the day of the birth, but conception of our Saviour. Though the Florentines retain the day of the birth, and begin their year from Christmas.

INCARNATION, formed from *in*, and *caro* "flesh," in sur-

gery, signifies the healing and filling up of ulcers and wounds with new flesh. See **SURGERY**.

INCARNATIVES, in surgery, medicines which assist nature in filling up wounds or ulcers with flesh; or rather remove the obstructions thereto. The term is now obsolete.

INCENDIARY, in law, is applied to one who is guilty of maliciously setting fire to another's dwelling-house, and all out-houses that are parcel thereof, though not contiguous to it or under the same roof, as barns and stables. A bare intent or attempt to do this, by actually setting fire to a house, unless it absolutely burns, does not fall within the description of *incendit et combussit*. But the burning and consuming of any part is sufficient; though the fire be afterwards extinguished. It must also be a malicious burning; otherwise it is only a trespass. This offence is called *arson* in our law.

Among the ancients, criminals of this kind were to be burnt. *Qui ædis, acrumque frumenti juxta domum possum, sciens, frudensque dolo malo combussit, vinctus igni necatur*. The punishment of *arson* was death by our ancient Saxon laws and by the Gothic constitutions: and in the reign of Edward I. incendiaries were burnt to death. The stat. 8 Hen. VI. c. 6. made the wilful burning of houses, under special circumstances, high treason; but it was reduced to felony by the general acts of Edward VI. and Queen Mary. This offence was denied the benefit of clergy by 21 Hen. VIII. c. 1. which statute was repealed by 1 Edw. VI. c. 12; and arson was held to be ousted of clergy, with respect to the principal, by inference from the stat. 4 and 5 P. and M. c. 4. which expressly denied it to the accessory; though now it is expressly denied to the principal also, by 9 Geo. I. c. 27.

INCENSE, or **FRANKINCENSE**, in the materia medica, &c. a dry resinous substance, known among authors by the names **THUS** and **OLIBANUM**. Incense is a rich perfume, with which the Pagans, and the Roman Catholics still, perfume their temples, altars, &c. The word comes from the Latin *incensum*, q. d. *burnt*; as taking the effect for the thing itself.

The burning of incense made part of the daily service of the ancient Jewish church. The priests drew lots to know who should offer it: the destined person took a large silver dish, in which was a censer full of incense, and, being accompanied by another priest carrying some live coals from the altar, went into the temple. There, in order to give notice to the people, they struck upon an instrument of brass placed between the temple and the altar; and being returned to the altar, he who brought the fire left it there, and went away. Then the offerer of incense, having said a prayer or two, waited the signal, which was the burning of the holocaust; immediately upon which he set fire to the incense, the whole multitude continuing all the time in prayer. The quantity of incense offered each day was half a pound in the morning, and as much at night. One reason of this continual burning of incense might be, that the multitude of victims that were continually offered up, would have made the temple smell like a slaughter-house, and consequently have inspired the corners rather with disgust and aversion, than awe and reverence, had it not been overpowered by the agreeable fragrance of those perfumes.

INCEPTIVE, a word used by Dr. Wallis to express such moments, or first principles, which, though of no magnitude themselves, are yet capable of producing such as are. Thus a point has no magnitude itself, but is inceptive of a line which it produces by its motion. So a line, though it have no breadth, is yet inceptive of breadth; that is, it is capable, by its motion, of producing a surface which has breadth, &c.

INCEST, the crime of venereal commerce between persons who are related in a degree wherein marriage is prohibited by the law of the country. Some are of opinion, that marriage ought to be permitted between kinsfolks, to the end that the at-

fection so necessary in marriage might be heightened by this double tie : yet the rules of the church have formerly extended this prohibition to the seventh degree ; but time has now brought it down to the third or fourth degree.

Most nations look on incest with horror, Persia and Egypt alone excepted. In the history of the ancient kings of those countries we meet with instances of the brother's marrying the sister : the reason was, because they thought it too mean to join in alliance with their own subjects, and still more so to marry into any foreign family.

Spiritual INCEST, a crime committed in like manner between persons who have a spiritual alliance by means of baptism or confirmation. Spiritual incest is also understood of a vicar, or other beneficiary, who enjoys both the mother and daughter ; that is, holds two benefices, the one whereof depends upon the collation of the other. This renders both the one and the other of these benefices vacant.

INCH, a well known measure of length ; being the twelfth part of a foot, and equal to three barley-corns in length.

INCH, contracted from the Gaelic *innis* "an island," a word prefixed to the names of different places in Scotland and Ireland.

INCH-COLM or *Columba*, an island of Scotland, lying in the frith of Forth, near the coast of Fife, but within the county of Edinburgh. Here are the fine ruins of a once celebrated monastery, founded in 1123, by Alexander I. in gratitude, it is said, for his escape, when driven on this island in a violent tempest, and for the hospitable treatment he received here, for three days, from a hermit, who entertained him with the milk of his cow, and a few shell fish. It was of the order of Augustines, and dedicated to St. Columba. At present, some fowls that haunt the ancient tower, and the rabbits that lodge in the mouldering soil, have full possession of this neglected spot.

INCH-KEITH, a desolate little island of Edinburghshire, in Scotland, in the frith of Forth, lying midway between the ports of Leith and Kinghorn. Here is a ruinous fort. The shore of this island, like that of Inchcolm, is bold and rugged, exhibiting several deep caverns, shelving cliffs, and towering rocks.

INCH-MARNOC, a beautiful little island of Scotland, to the S. W. of the isle of Bute. It is about a mile long ; and on the W. side are vast strata of coral and shells. It derives its name of Inchmarnoc (Marnoc's Isle) from a chapel dedicated to St. Marnoc, the ruins of which are still to be seen here.

INCHANTMENT. See WITCHCRAFT.

INCHOATIVE, a term signifying the beginning of a thing or action ; the same with what is otherwise called *inceptive*. Inchoative verbs denote, according to Priscian and other grammarians, verbs that are characterised by the termination *scio* or *scor*, added to their primitives : as *augeo* from *augeo*, *caleo* from *calco*, *dulcesco* from *dulcis*, *irascor* from *ira*, &c.

INCIDENCE, denotes the direction in which one body strikes on another. See OPTICS and MECHANICS.

Angle of INCIDENCE. See ANGLE.

INCIDENT, in a general sense, denotes an event, or a particular circumstance of some event.

INCIDENT, in law, is a thing appertaining to, or following another, that is more worthy or principal. A court-baron is inseparably incident to a manor ; and a court of pie-powders to a fair.

INCIDENT, in a poem, is an episode, or particular action, joined to the principal action, or depending on it. A good comedy should be full of agreeable incidents, which divert the spectators, and form the intrigue. The poet ought always to make choice of such incidents as are susceptible of ornament suitable to the nature of his poem. The variety of incidents well conducted makes the beauty of an heroic poem, which ought always to take in a certain number of incidents to suspend the catastrophe, that would otherwise break out too soon.

INCINERATION, from *in*, and *cinis* "ashes," in chemistry, the reduction of vegetables into ashes, by burning them gently.

INCISIVE, an appellation given to whatever cuts or divides ; thus, the fore teeth are called *dentes incisivi* or cutters ; and medicines of an attenuating nature were formerly named incidents, or incisive medicines.

INCLE, a coarse and narrow kind of tape made of linen yarn.

INCLINATION, is a word frequently used by mathematicians, and signifies the mutual approach, tendency, or leaning of two lines or two planes towards each other, so as to make an angle.

INCLINATION in a moral sense. See APPETITE.

INCLINED PLANE, in mechanics, one that makes an oblique angle with the horizon. See MECHANICS.

INCOGNITO, or INCOG, is applied to a person who is in any place where he would not be known : but it is more particularly applied to princes, or great men, who enter towns, or walk the streets, without their ordinary train or the usual marks of their distinction and quality.

INCOMBUSTIBLE CLOTH. See ASBESTOS. On this Cronstedt observes, that the natural store of the asbesti is in proportion to their economical use, both being very inconsiderable. "It is an old tradition (says he), that in former ages they made clothes of the fibrous asbesti, which is said to be composed by the word *byssus* ; but it is not very probable, since, if one may conclude from some trifles now made of it, as bags, ribbons, and other things, such a dress could neither have an agreeable appearance, nor be of any conveniency or advantage. It is more probable that the Scythians dressed their dead bodies, which were to be burned, in a cloth manufactured of this stone ; and this perhaps has occasioned the above fable." M. Magellan confirms this opinion of Cronstedt's, and informs us that some of the Romans also inclosed dead bodies in cloth of this kind. In the year 1756 or 1757, he tells us that he saw a large piece of asbestos cloth found in a stone tomb, with the ashes of a Roman, as appeared by the epitaph. It was kept, with the tomb also, if our author remembers rightly, in the right hand wing of the Vatican library at Rome. The under librarian, in order to show that it was incombustible, lighted a candle, and let some drops of wax fall on the cloth, which he set on fire with a candle in his presence without any detriment to the cloth. Its texture was coarse, but much softer than he could have expected.

INCOMMENSURABLE, a term in geometry, used where two lines, when compared to each other, have no common measure, how small soever, that will exactly measure them both. And in general, two quantities are said to be incommensurable, when no third quantity can be found that is an aliquot part of both.

INCOMMENSURABLE Numbers, are such as have no common divisor that will divide them both equally.

INCONTINENCE, inordinacy of the sexual appetite ; lust. It is the opposite of chastity. See CHASTITY and CONTINENCE.

INCONTINENCE, in the eye of law, is of divers kinds ; as in cases of bigamy, rapes, sodomy, or buggery, getting bastards ; all which are punished by statute. See 25 Hen. VIII. cap. 6. 18 Eliz. cap. 7. 1 Jac. I. cap. 11. Incontinency of priests is punishable by the ordinary, by imprisonment, &c. 1 Hen. VII. cap. 4.

INCONTINENCE, in medicine, signifies an inability in any of the organs to retain what should not be discharged without the concurrence of the will. But incontinence is most frequently used with regard to an involuntary discharge of urine.

INCORPORATION, in pharmacy, is much the same as impastation, being a reduction of dry substances to the consistence of a paste, by the admixture of some fluid : thus pills,

holes, troches, and plasters, are made by incorporation. Another incorporation is when things of different consistencies are by digestion reduced to one common consistence.

INCORPORATION OF *Body-Corporate*. See CORPORATION.

INCORPOREAL, spiritual; a thing, or substance, which has no body. Thus the soul of man is incorporeal, and may subsist independent of the body. See METAPHYSICS.

INCORRUPTIBLE, that which cannot be corrupted. Thus spiritual substances, as angels, human souls, &c. and thus also glass, gold, mercury, &c. may be called *incorruptible*.

INCORRUPTIBLES, INCORRUPTIBLES, the name of a sect which sprang out of the Eutychians. Their distinguishing tenet was, that the body of Jesus Christ was incorruptible; by which they meant, that after and from the time wherein he was formed in the womb of his holy mother, he was not susceptible of any change or alteration; not even of any natural and innocent passions, as of hunger, thirst, &c. so that he ate without any occasion, before his death, as well as after his resurrection. And hence it was that they took their name.

INCRASSATING, in pharmacy, &c. the rendering of fluids thicker by the mixture of other substances less fluid, or by the evaporation of the thinner parts.

INCUBATION, the action of a hen, or other fowl, brooding on her eggs. See HATCHING.

INCUBUS, NIGHT-MAKE, a disease consisting in an oppression of the breast, so very violent, that the patient cannot speak or even breathe. The word is derived from the Latin *incubare*, to "lie down" on any thing and press it: the Greeks call it *εραλγης*, q. d. *saltator*, "leaper," or one that rusheth on a person. In this disease the senses are not quite lost, but drowned and astonished, as are the understanding and imagination; so that the patient seems to think some huge weight thrown on him, ready to strangle him. Children are very liable to this distemper; so are fat people, and men of much study and application of mind. The stomach in all these is materially concerned; as the complaint is most liable to occur after eating too great a supper, or preferring such articles of food as are known to be difficult of digestion.

INCUMBENT, a clerk or minister who is resident on his benefice; he is called *incumbent*, because he does, or at least ought to, bend his whole study to discharge the cure of his church.

INCURVATION of the RAYS of LIGHT, their bending out of a rectilinear straight course, occasioned by refraction. See OPTICS.

INCUS, in anatomy, a bone of the internal ear, somewhat resembling one of the anterior dentes molares.

INDEFEASIBLE, a term in law for what cannot be defeated or made void; as an indefeasible estate of inheritance, &c.

INDEFEASIBLE *Right to the Throne*. See HEREDITARY *Right*.

INDEFINITE, that which has no certain bounds, or to which the human mind cannot affix any.

INDEFINITE, in grammar, is understood of nouns, pronouns, verbs, participles, articles, &c. which are left in an uncertain indeterminate sense, and not fixed to any particular time, thing, or other circumstance.

INDELIBLE, something that cannot be cancelled or effaced.

INDEMNIFY, in law, the saving harmless; or a writing to secure one from all damage and danger that may ensue from any act.

INDENTED, in heraldry, is when the outline of an ordinary is notched like the teeth of a saw.

INDENTURE, in law, a writing which comprises some contract between two at least; being indented at top, answerable to another part which has the same contents. See DEED.

INDEPENDENTS, a sect of protestants in England and Holland: so called, as denying not only any subordination among their clergy, but also all *dependency* on any other assem-

bly. They maintain, that every separate church, or particular congregation, has in itself radically and essentially every thing necessary for its own government; that it has all ecclesiastical power and jurisdiction; and is not at all subject to other churches, or their deputies, nor to their assemblies, or synods.

Robinson, the founder of the sect, makes express use of this term in explaining his doctrine relating to ecclesiastical government: *Cœum quœlibet particularem*, (says he, in his *Apologia*, cap. v. p. 22.) *esse totam, integram et perfectam ecclesiam ex suis partibus constantem, immediate et independentem (quoad alias ecclesias) sub ipso Christo*. It may probably have been from this very passage that the title of *Independents* was originally derived. The disciples of Robinson, originally called Brownists, because John Robinson, the founder of this sect, was pastor of a congregation of Brownists that had settled at Leyden, did not reject the appellation of *Independents*. It was certainly utterly unknown in England before the year 1640; at least it is not once mentioned in the ecclesiastical canons and constitutions that were drawn up during that year, in the synods or visitations held by the archbishops of Canterbury, York, and other prelates, in which canons all the various sects that then subsisted in England are particularly mentioned. See Wilkins's *Concilia Magnæ Britanniae et Hiberniae*, vol. iv. cap. 5. p. 548.

It is true, that not long after this period, and more particularly from the year 1642, we find this denomination very frequently in the English annals. The English *Independents* were so far from being displeased with it, that they assumed it publicly in a piece which they published in their own defence at London, in the year 1644, entitled *Apologetical Narration of the Independents*. But in process of time, in order to avoid the odium of sedition and anarchy charged on this sect, the true and genuine *Independents* renounced this title, and called themselves *Congregational Brethren*, and their religious assemblies *congregational churches*. The first *Independent* or congregational church in England was set up in the year 1616, by Mr. Jacob, who had adopted the religious sentiments of Robinson. The *Independents*, though sprung originally from a congregation of Brownists, were much more commendable than the latter, both in the moderation of their sentiments and the order of their discipline. The Brownists, as we have already mentioned under BARROWISTS, allowed all ranks and orders of men promiscuously to teach in public, and to perform the other pastoral functions; whereas the *Independents* had, and still have, a certain number of ministers, for the most part regularly educated, chosen respectively by the congregations where they are fixed; nor is any person among them permitted to speak in public, before he has submitted to a proper examination of his capacity and talents, and been approved of by the congregation to which he ministers. The charge alleged against them by our historian Rapin, (*Hist. of England*, vol. ii. p. 514. fol. ed.) who says, that they could not so much as endure ordinary ministers in the church, &c. is, therefore, evidently false and groundless. He was led into his mistake by confounding the *Independents* and Brownists. There are other charges, no less unjustifiable, that have been urged against the *Independents*, by this celebrated historian, and others of less note. Rapin says, that with regard to the state, they abhorred monarchy, and approved only a republican government. This might have been true with regard to several persons among the *Independents*, in common with those of other sects; but it does not appear from any of their public writings, that republican principles formed the distinguishing characteristic of this sect. On the contrary, in a public memorial drawn up by them in 1647, they declare, that they do not disapprove of any form of civil government, but do freely acknowledge, that a kingly government, bounded by just and wholesome laws, is both allowed by God, and also a good accommodation unto men. The *In-*

dependents, however, have been generally distinguished by the denomination of regicides; under a notion, that they were chargeable with the death of Charles I. Whether this fact be admitted or denied, and this is not a place proper for the investigation of it, no conclusion can be fairly drawn from the greater prevalence of republican principles, or from violent proceedings at that period, that can affect the distinguishing tenets and conduct of the *Independents* in general; and especially of the sect that bears this denomination in our times. It is certain, that our *Independents* are steady friends to a limited monarchy. Rapin is farther mistaken, when he represents the religious principles of the *Independents* as contrary to those of all the rest of the world. It appears from two confessions of faith, one composed by Robinson, on behalf of the English *Independents* in Holland, and published at Leyden in 1619, entitled, *Apologia pro Exulibus Anglis, qui Brownistæ vulgo appellantur*; and another drawn up in London in the year 1658, by the principal members of this community in England, entitled, *A Declaration of the Faith and Order owned and practised by the Congregational Churches in England*, agreed upon and consented unto by their Elders and Messengers, in their Meeting at the Savoy, Oct. 12, 1658; as well as from other writings of the *Independents*, that they differed from the sect of the reformed in no single point of any consequence, except that of ecclesiastical government; and their religious doctrines were almost entirely the same with those that are adopted by the church of Geneva. During the administration of Cromwell, the *Independents* acquired very considerable reputation and influence; and he made use of them as a check to the ambition of the Presbyterians, who aimed at a very high degree of ecclesiastical power, and who had succeeded, soon after the elevation of Cromwell, in obtaining a parliamentary establishment of their own church government. But after the restoration of Charles II. their cause declined; and in the year 1691, under the reign of king William, they entered into an association with the Presbyterians residing in and about London, under certain heads of agreement, comprised in nine articles, that tended to the maintenance of their respective institutions. These may be found in the second volume of Whiston's *Memoirs of his Life and Writings*; and the substance of them in Mosheim.

At this time the *Independents* and Presbyterians, called from this association the United Brethren, were agreed with regard to doctrines, being generally Calvinists, and differed only with respect to ecclesiastical discipline. But at present, though the English *Independents* and Presbyterians form two distinct parties of Protestant Dissenters, they are distinguished by very trifling differences with regard to church government; and the denominations are more arbitrarily used to comprehend those who differ in theological opinions. The *Independents* are generally more attached to the tenets distinguished by the term *ORTHODOXY* or *CALVINISM*, than the *PRESBYTERIANS*.

Independence is peculiar to Great Britain; the British colonies of America, whither it was carried first in 1620, and by successive Puritan emigrants in 1629 and 1633, from England, and the United Provinces. One Morel, in the sixteenth century, endeavoured to introduce it into France; but it was condemned at the synod of Rochelle, where Beza presided; and again at the synod of Rochelle, in 1644.

On the subject of this article, see Mosheim's *Eccl. Hist.* by Maclean, vol. iv. p. 522, &c. 8vo. Neal's *Hist. of the Puritans*, vol. ii. p. 107, &c. vol. iii. p. 547, &c. vol. iv. p. 187, &c. Burnet's *Hist. of his Own Times*, vol. i. p. 46, &c.

INDEX, in anatomy, denotes the fore-finger. It is thus called from *indico*, *I point* or *direct*; because that finger is generally so used: whence also the extensor indicis is called *indicator*.

INDEX, in arithmetic and algebra, shows to what power any quantity is involved, and is otherwise called its *exponent*. See *ALGEBRA*, p. 104.

INDEX of a Book, is that part annexed to a book, referring to the particular matters or passages therein contained.

INDEX of a Globe, is a little style fitted on to the north pole, and turning round with it, pointing to certain divisions in the hour-circle. It is sometimes also called *gnomon*. See *GLOBE*.

Expurgatory INDEX, a catalogue of prohibited books in the church of Rome. The first catalogues of this kind were made by the inquisitors; and these were afterwards approved of by the council of Trent, after some alteration was made in them by way of retrenchment or addition. Thus an index of heretical books being formed, it was confirmed by a bull of Clement VIII. in 1595, and printed with several introductory rules; by the fourth of which, the use of the Scriptures in the vulgar tongue is forbidden to all persons without a particular licence; and by the tenth rule it is ordained, that no book shall be printed at Rome without the approbation of the Pope's vicar, or some person delegated by the Pope; nor in any other places, unless allowed by the bishop of the diocese, or some person deputed by him, or by the inquisitor of heretical pravity.

The Trent index being thus published, Philip II. of Spain ordered another to be printed at Antwerp, in 1571, with considerable enlargements. Another index was published in Spain in 1584; a copy of which was snatched out of the fire when the English plundered Cadiz. Afterwards there were several expurgatory indexes printed at Rome and Naples, and particularly in Spain.

INDIA, an extensive region in Asia, which lies between 66° and 93° E. lon. and 7° and 35° N. lat. But, under this name, the Europeans have erroneously understood all the countries which lie S. of Tartary, and extend from the eastern frontiers of Persia to the eastern coasts of China; and they have included likewise under the denomination of the E. Indies the islands of Japan, with all the islands in the Eastern and Indian Oceans, as far S. as New Holland. But the name of India can be applied, with propriety, to that country only which is distinguished in Asia as well as in Europe by the name of Hindoostan. The countries to the E. of the river Burrampooter (namely, Aracan, Assam, Burmah, Cambodia, Cochinchina, Laos, Malacca, Pegu, Siam, and Tonquin), which geographers have hitherto distinguished by the name of the Peninsula beyond the Ganges, are no more to be considered as belonging to India, than the bordering countries of China, Thibet, Tartary, or Persia. See *HINDOOSTAN*.

INDIA Company. See *COMPANY*.

INDIA Rubber. See *CAOUTCHOUC*.

INDIAN, in a general sense, denotes any thing belonging to the Indies, East or West.

INDIAN Berry. See *MENISPERMUM*.

INDIAN Bread. See *JATROPHA*.

INDIAN Corn, or *Maize*. See *ZEAL*.

INDIAN Cresses. See *TROPÆOLUM*.

INDIAN Fig. See *BANIAN Tree*.

INDIAN Pagod-tree. See *CACTUS*.

INDIAN Ink. See *INK*.

INDIAN Reed. See *CANNA*.

INDIANS. See the articles *INDIA*, *HINDOOSTAN*, and *AMERICA*.

INDICATION, in physic, whatever serves to direct the physician how to act in the treatment of a disease.

INDICATIVE, in grammar, the first mood or manner of conjugating a verb, by which we simply affirm, deny, or ask something: as, *amant*, they love; *non amant*, they do not love; *amantne?* do they not love? See *GRAMMAR*.

INDICTION, in chronology, a cycle of 15 years. See *CYCLE*.

INDICTMENT, in law, one of the modes of prosecuting an offender. See **PROSECUTION**. In English law, it is a written accusation of one or more persons of a crime or misdemeanor, preferred to, and presented upon oath by, a grand jury. To this end, (Judge Blackstone observes,) the sheriff of every county is bound to return to every session of the peace, and every commission of *oyer and terminer*, and of general gaol-delivery, twenty-four good and lawful men of the county, some out of every hundred, to inquire, present, do, and execute all those things, which on the part of our lord the king shall then and there be commanded them. They ought to be freeholders; but to what amount is uncertain: which seems to be *causus omnis*, and as proper to be supplied by the legislature as the qualifications of the petit jury; which were formerly equally vague and uncertain, but are now settled by several acts of parliament. However, they are usually gentlemen of the best figure in the county. As many as appear upon this pannel, are sworn upon the grand jury, to the amount of twelve at the least, and not more than twenty-three; that twelve may be a majority. Which number, as well as the constitution itself, we find exactly described so early as the laws of king Ethelred: *Exeant seniores duodecim thani, et praefectus cum eis, ut jurent super sanctuarium quod eis in manus datur, quod non int ullum innocentem accusare, nec aliquem noxium celare*. Wilk. L. L. Ann. Lex. 117. In the time of king Richard I. (according to Hoveden) the process of electing the grand jury, ordained by that prince, was as follows: Four knights were to be taken from the county at large, who chose two more out of every hundred; which two associated to themselves ten other principal freemen, and those twelve were to answer concerning all particulars relating to their own district. This number was probably found too large and inconvenient; but the traces of this institution still remain, in that some of the jury must be summoned out of every hundred. This grand jury are previously instructed in the articles of their inquiry, by a charge from the judge who presides upon the bench. They then withdraw to sit and receive indictments, which are preferred to them in the name of the king, but at the suit of any private prosecutor; and they are only to hear evidence on behalf of the prosecution: for the finding of an indictment is only in the nature of an inquiry or accusation, which is afterwards to be tried and determined; and the grand jury are only to inquire upon their oaths, whether there be sufficient cause to call upon the party to answer it. A grand jury, however, ought to be thoroughly persuaded of the truth of an indictment, so far as their evidence goes; and not to rest satisfied merely with remote probabilities: a doctrine that might be applied to very oppressive purposes.

The grand jury are sworn to inquire only for the body of the county, *pro corpore comitatûs*; and therefore they cannot regularly inquire of a fact done out of that county for which they are sworn, unless particularly enabled by act of parliament. And to so high a nicety was this matter anciently carried, that where a man was wounded in one county, and died in another, the offender was at common law indictable in neither, because no complete act of felony was done in any one of them: but by statute 2 and 3 Ed. VI. c. 24. he is now indictable in the county where the party died. And by statute 2 Geo. II. c. 21. if the stroke or poisoning be in England, and the death upon the sea or out of England, or *vice versa*, the offenders, and their accessories, may be indicted in the county where either the death, poisoning, or stroke shall happen. And so in some other cases; as particularly, where treason is committed out of the realm, it may be inquired of in any county within the realm, as the king shall direct, in pursuance of statutes 26 Hen. VIII. c. 13; 33 Hen. VIII. c. 23; 35 Hen. VIII. c. 2; 5 and 6 Edw. VI. c. 11. And counterfeiters, washers, or minishers

of the current coin, together with all manner of felons and their accessories, may, by statute 26 Hen. VIII. c. 6. (confirmed and explained by 34 and 35 Hen. VIII. c. 26. § 75. 76.) be indicted and tried for those offences, if committed in any part of Wales, before the justices of gaol-delivery and of the peace, in the next adjoining county of England, where the king's writ runneth: that is, at present in the county of Hereford or Salop; and not, as it should seem, in the county of Chester or Monmouth: the one being a county palatine, where the king's writ did not run; and the other a part of Wales, in 26 Hen. VIII. Murders also, whether committed in England or in foreign parts, may, by virtue of the statute 33 Hen. VIII. c. 23. be inquired of and tried by the king's special commission in any shire or place in the kingdom. By statute 10 and 11 W. III. c. 25. all robberies, and other capital crimes, committed in Newfoundland, may be inquired of and tried in any county in England. Offences against the black act, 9 Geo. I. c. 22. may be inquired of and tried in any county of England, at the option of the prosecutor. So felonies, in destroying turnpikes, or works upon navigable rivers, erected by authority of parliament, may, by statutes 8 Geo. II. c. 20. and 13 Geo. III. c. 84. be inquired of and tried in any adjacent county. By statute 26 Geo. II. c. 19. plundering or stealing from any vessel in distress or wrecked, or breaking any ship contrary to 12 Ann. st. 2. c. 18. may be prosecuted either in the county where the fact is committed, or in any county next adjoining; and if committed in Wales, then in the next adjoining English county: by which is understood to be meant, such English county as, by the statute 26 Hen. VIII. above mentioned, had before a concurrent jurisdiction of felonies committed in Wales. Felonies committed out of the realm, in burning or destroying the king's ships, magazines, or stores, may, by statute 12 Geo. III. c. 24. be inquired of and tried in any county of England, or in the place where the offence is committed. By statute 13 Geo. III. c. 63. misdemeanors committed in India may be tried upon information or indictment in the court of king's bench in England; and a mode is marked out for examining witnesses by commission, and transmitting their depositions to the court. But, in general, all offences must be inquired into, as well as tried, in the county where the fact is committed. Yet if larceny be committed in one county, and the goods carried into another, the offender may be indicted in either; for the offence is complete in both. Or he may be indicted in England for larceny in Scotland, and carrying the goods with him into England, or *vice versa*; or for receiving in one part of the united kingdom goods that have been stolen in another. But for robbery, burglary, and the like, he can only be indicted where the fact was actually committed: for though the carrying away and keeping of the goods is a continuation of the original taking, and is therefore larceny in the second county, yet it is not a robbery or burglary in that jurisdiction. And if a person be indicted in one county for larceny of goods originally taken in another, and be thereof convicted, or stands mute, he shall not be admitted to his clergy; provided the original taking be attended with such circumstances as would have ousted him of his clergy by virtue of any statute made previous to the year 1691.

When the grand jury have heard the evidence, if they think it a groundless accusation, they used formerly to endorse on the back of the bill, *Ignoramus*; or, We know nothing of it: intimating, that though the facts might possibly be true, that truth did not appear to them. But now they assert in English more absolutely, *Not a true bill*; or (which is the better way) *Not found*: and then the party is discharged without farther answer. But a fresh bill may afterwards be preferred to a subsequent grand jury. If they are satisfied of the truth of the accusation, they then endorse upon it, "A true bill;" anciently.

Billa vera. The indictment is then said to be found, and the party stands indicted. But to find a bill, there must at least twelve of the jury agree: for so tender is the law of England of the lives of the subjects, that no man can be convicted at the suit of the king, of any capital offence, unless by the unanimous voice of twenty-four of his equals and neighbours; that is, by twelve at least of the grand jury, in the first place, assenting to the accusation; and afterwards by the whole petit jury of twelve more, finding him guilty upon his trial. But if twelve of the grand jury assent, it is a good presentment, though some of the rest disagree. And the indictment, when so found, is publicly delivered into court.

Indictments must have a precise and sufficient certainty. By statute 1 Hen. V. c. 5. all indictments must set forth the christian name, surname, and addition of the state and degree, mystery, town, or place, and the county of the offender; and all this to identify his *person*. The *time* and *place* are also to be ascertained, by naming the day and township in which the fact was committed: though a mistake in these points is in general notheld to be material, provided the *time* be laid previous to the finding of the indictment, and the *place* to be within the jurisdiction of the court; unless where the place is laid, not merely as a *venue*, but as part of the description of the fact. But sometimes the *time* may be very material, where there is any limitation in point of time assigned for the prosecution of offenders; as by the statute 7 Will. III. c. 3. which enacts, that no prosecution shall be had for any of the treasons or misprisions therein mentioned (except an assassination designed or attempted on the person of the king), unless the bill of indictment be found within three years after the offence committed; and, in case of murder, the time of the death must be laid within a year and a day after the mortal stroke was given. The offence itself must also be set forth with clearness and certainty; and in some crimes particular words of art must be used, which are so appropriated by the law to express the precise idea which it entertains of the offence, that no other words, however synonymous they may seem, are capable of doing it. Thus, in treason, the facts must be laid to be done "treasonably, and against his allegiance;" anciently *proditorie et contra ligantia sue debiti*; else the indictment is void. In indictments for murder, it is necessary to say that the party indicted "murdered," not "killed" or "slew," the other; which, till the late statute, was expressed in Latin by the word *murdravit*. In all indictments for felonies, the adverb "feloniously," *felonice*, must be used; and for burglaries also, *burglariter*, or, in English, "burglariously;" and all these to ascertain the intent. In rapes, the word *rapuit*, or "ravished," is necessary, and must not be expressed by any periphrasis, in order to render the crime certain. So in larcenies also, the words *felonice cepit et asportavit*, "feloniously took and carried away," are necessary to every indictment; for these only can express the very offence. Also, in indictments for murder, the length and depth of the wound should in general be expressed, in order that it may appear to the court to have been of a mortal nature: but if it goes through the body, then its dimensions are immaterial; for that is apparently sufficient to have been the cause of the death. Also, where a limb, or the like, is absolutely cut off, there such description is needless. Lastly, in indictments, the *value* of the thing which is the subject or instrument of the offence must sometimes be expressed. In indictments for larcenies this is necessary, that it may appear whether it be grand or petit larceny; and whether entitled or not to the benefit of clergy. In homicides of all sorts it is necessary; as the weapon with which it is committed is forfeited to the king as a deodand. For the manner of process upon an indictment, see PROCESS.

Plea to INDICTMENT. See PLEA.

East INDIES. See HINDOOSTAN, and plate 9.

West INDIES, the name given to a great number of islands in the Atlantic Ocean, which extend across the entrance of the gulf of Mexico, from the N. W. extremity of the Bahama Islands, off the coast of Florida, in N. lat. 27. 45, in a south-easterly direction, to the island of Tobago, which is 120 miles from the coast of Terra Firma, in N. lat. 11. 30. They lie between 59° and 86° W. lon. Cuba being the most western, and Barbadoes the most eastern of all these islands. When Columbus discovered them in 1492, he considered them as part of those vast regions in Asia, comprehended under the general name of India, to reach which, by a course due W. across the Atlantic Ocean, had been the grand object of his voyage; and this opinion was so general, that Ferdinand and Isabella, king and queen of Castile, in their ratification of an agreement, granted to Columbus, upon his return, gave them the name of *Indes*. Even after the error which gave rise to this opinion was detected, and the true position of the New World was ascertained, the name has remained, and the appellation of the *West Indies* is given by all the people of Europe to these islands, and that of *Indians* to the inhabitants, not only of these islands, but of the two continents of America. They are likewise called the Caribbee islands, from the aborigines of the country; and the sea in which they lie, is sometimes called, by modern geographers, the Archipelago of the Caribbees. By the French they are called the Antilles; and nautical men distinguish them, from the different courses taken by ships, into the Leeward and Windward Islands; which see. The name of Caribbee should properly be confined to the smaller islands, which lie between Porto Rico and Tobago. These were inhabited by the Caribbees, a fierce race of men, no wise resembling their feeble and timid neighbours in the larger islands. Columbus, in his second voyage, was a witness to their intrepid valour. The same character they have maintained invariably in all subsequent contests with the people of Europe; and, even in our times, we have seen them make a gallant stand in defence of the last territory (the island of St. Vincent) which the rapacity of their invaders had left in their possession. The British Islands are Jamaica, Barbadoes, St. Christopher, Antigua, Nevis, Montserrat, Barbuda, Anguilla, Dominica, St. Vincent, Granada, the Bahama Islands, part of the Virgin Islands, and Tobago; which last was taken from the French, April 15, 1793. Cuba, Porto Rico, Trinidad, and Margareta belong to the Spaniards, who likewise have the eastern part of Hispaniola. To the French belong Martinico, Guadeloupe, St. Lucia, Marigalante, Desada, and the western part of Hispaniola. The Dutch have St. Eustatia, Curacao, Saba, and St. Martin; the Danes, St. Thomas, St. Croix, and part of the Virgin Islands; and the Swedes, St. Bartholomew.

INDIGENOUS, of *indigena*, denotes a native of a country, or that which was originally born or produced in the country where it is found. In this sense, particular species of animals and plants are said to be *indigenous* in the country where they are native, in opposition to EXOTIC.

INDIGESTION, a crudity, or want of due coction of the food in the stomach. See DIGESTION.

INDIGETES, a name which the ancients gave to some of their gods. There are various opinions about the origin and signification of this word. Some pretend it was given to all the gods in general; and others, only to the demigods, or great men deified. Others say, it was given to such gods as were originally of the country, or rather such as were the gods of the country that bore this name; and others again hold it was ascribed to such gods as were patrons and protectors of particular cities. Lastly, others hold *indigetes* to be derived from *inde genitus* or *in loco degens*, or from *inde* and *ago*, for *dego*, "I live, I inhabit;" which last opinion seems the most probable.

In effect it appears, 1. That these *indigetes* were also called *local gods*, (*dii locales*), or *topical gods*, which is the same thing.



2. The *indigetes* were ordinarily men deified, who indeed were in effect local gods, being esteemed the protectors of those places where they were deified; so that the second and third opinions are very consistent. 3. Virgil joins *patrii* with *indigetes*, as being the same thing, *Georg.* i. ver. 498. "*Dii patrii, indigetes.*"

4. The gods to whom the Romans gave the name *indigetes* were, Faunus, Vesta, Æneas, Romulus, all the gods of Italy; and at Athens, Minerva, says Servius; and at Carthage, Dido. It is true, we meet with Jupiter *indiges*: but that Jupiter *indiges* is Æneas, not the great Jupiter; as we may see in Livy, lib. i. cap. 3. in which last sense, Servius assures us, *indiges* comes from the Latin *in diis ago*, "I am among the gods."

Among these *indigetes* gods, there was none more celebrated, nor more extensively worshipped, than HERCULES.

INDIGO, a dye prepared from the leaves and small branches of the *Indigofera Tinctoria*. See the next article.

INDIGOFERA, the INDIGO PLANT: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The calyx is patent; the carina of the corolla furnished with a subulated patulous spur on each side; the legumen is linear.—There are five species; the most remarkable of which is the *tinctoria*, a native of the warm parts of Asia, Africa, and America, and from which the indigo dye is made. The root of this plant is three or four lines thick, and more than a foot long, of a faint smell something like parsley. From this root issues a single stem nearly of the same thickness, about two feet high, straight, hard, almost woody, covered with a bark slightly split, of a grey ash-colour towards the bottom, green in the middle, reddish at the extremity, and without appearance of pith in the inside. The leaves, ranged in pairs around the stalk, are of an oval form, smooth, soft to the touch, furrowed above, of a deep green on the under-side, and connected by a very short peduncle. From about one-third of the stem to the extremity there are ears that are loaded with very small flowers from a dozen to 15, but destitute of smell. The pistil, which is in the midst of each flower, changes into a pod, in which the seeds are inclosed.

This plant requires a smooth rich soil, well tilled, and not too dry. The seed of it, which, as to figure and colour, resembles gun-powder, is sown in little furrows that are about the breadth of the hoe, two or three inches deep, at a foot distance from each other, and in as straight a line as possible. Continual attention is required to pluck up the weeds, which would soon choke the plant. Though it may be sown in all seasons, the spring is commonly preferred. Moisture causes this plant to shoot above the surface in three or four days. It is ripe at the end of two months. When it begins to flower, it is cut with pruning-knives; and cut again at the end of every six weeks, if the weather is a little rainy. It lasts about two years, after which term it degenerates; it is then plucked up, and planted afresh. As this plant soon exhausts the soil, because it does not absorb a sufficient quantity of air and dew to moisten the earth, it is of advantage to the planter to have a vast space which may remain covered with trees, till it becomes necessary to fell them in order to make room for the indigo.

Indigo is distinguished into two kinds, the *true* and the *bastard*. Though the first is sold at a higher price on account of its superiority, it is usually advantageous to cultivate the other, because it is heavier. The first will grow in many different soils; the second succeeds best in those which are most exposed to the rain. Both are liable to great accidents. Sometimes the plant becomes dry, and is destroyed by an insect frequently found on it; at other times, the leaves, which are the valuable part of the plant, are devoured in the space of 24 hours by caterpillars. This last misfortune, which is but too common, has given occasion to the saying, "that the planters of indigo go to bed rich, and rise in the morning totally ruined." This production ought

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to be gathered in with great precaution, for fear of making the farina that lies on the leaves, and is very valuable, fall off by shaking it. M. Berthollet, in his "Elements of the Art of Dyeing," has many valuable remarks on the process of making indigo, and particularly of its chemical properties. We shall therefore continue this article by the following extracts from the work of that ingenious chemist:

"When the indigofera (says he) appears to be ripe, it is cut, and carried to the vats, where it is to undergo a fermentation, to which it is greatly disposed. If it be perfectly ripe when cut, the indigo it affords is of a finer colour, but much less in quantity, than if it be not arrived at a state of maturity: if it be over ripe, the quantity is still less, and its quality is bad.

"There are three vats placed one over another at different heights, and near a reservoir of water. The first is called the *sleeping vat*. Into this the plant is put, after having filled it with water to a certain height: a brisk fermentation soon commences, and much scum is formed. Mr. Quatremere says, that the disengaged gas is inflammable.

"When the indigo-maker finds the fermentation sufficiently advanced, and the colouring particles beginning to unite, he draws off the liquor into the second vat, called the *beating vat*, in which the liquor is beaten with instruments contrived for that purpose. Mr. Le Blond asserts, in the observations sent by him to the academy of sciences, that this operation is intended to dissipate the carbonic acid formed by the fermentation, which would prevent the precipitation of the colouring particles. He says, that the beating is not sufficient to procure the precipitation of all the colouring particles, and that a method has been tried in French Guiana, which, by producing a much more copious precipitate, revived the hopes of the colourists, who were abandoning this manufacture. This method consists in mixing with the liquor a quantity of lime-water, which absorbs its carbonic acid: but he thinks that this should not be carried beyond a certain proportion, and that an excess of lime-water is prejudicial. This method is not new: it is mentioned by father Labat. Mr. Struve also has thought, that lime-water would favour the precipitation of the indigo, by seizing the carbonic acid which held it in solution.

"When it is judged, from the blue colour, that the liquor is sufficiently beaten, it is left at rest about two hours, that the colouring particles may begin to separate from the liquor, which contains a yellow extractive matter, and it is then drawn off into a third vat, called the *settling vat*. The colouring particles are left to settle in this vat, the supernatant liquor of which is drawn off by two cocks placed one above the other; after which the colouring particles, then in a state of semifluidity, are drawn off by a third cock into a linen strainer in the shape of a jelly-bag; and when they are reduced to the consistence of a paste, they are turned out into square boxes, placed in the open air, under sheds which shelter them from the sun.

"The indigo produced in these operations differs, not only according to the quality of the plant which afforded it, but according to the care employed in its preparation. Its colouring part, however, appears to be invariably the same; so that the difference of its quality is entirely owing to the heterogeneous substances mixed with it, and the degree of consistence which it acquires in dyeing.

"There is a light sort that comes from Guatemala, of a fine blue colour, and called *light indigo*, or *flower indigo* (indigo flore). It swims on water, whilst all the other kinds sink in it. This sort is the finest and most valuable. There is a sort known by the name of *coppery indigo*, because its surface assumes a copper colour when rubbed against a hard body; and there are other sorts much less pure, as that which comes from Carolina.

"In the experiments of Bergman, one part in nine of indigo was found to be soluble in water by boiling. This part appeared to consist of mucilaginous, astringent, and saponaceous particles. The astringent particles are precipitable by solutions of alum, of sulphat of iron, and of copper.

"M. Quatremere also has separated the soluble parts by means of water. He asserts, that their quantity is greater in proportion as the indigo is inferior in quality; and that the residuum, after this operation, is equal to the finest indigo: whence he proposes, to purify indigo of inferior quality by boiling it in a bag, renewing the water till it will take no more colour. Unquestionably this operation would be of advantage, as it would deprive the indigo of the yellow matter capable of altering its colour: still however its quality might differ, on account of the earthy particles not soluble in water, which, it is true, could not affect its colour, but would vary the proportion of the colouring matter.

"Powdered indigo digested in *alcohol* gave a tincture at first yellow, then red, and at last brown. By this operation several times repeated, it lost about a seventeenth of its weight. From this tincture water separated a brownish resinous substance. *Ether* acts on indigo nearly in the same manner as alcohol; but oils, either fixed or volatile, have little action on it.

"Bergman mixed one part of indigo finely powdered, with eight parts of colourless *sulphuric acid*, so concentrated that its specific gravity was to that of distilled water as 1900 to 1000. The glass vessel in which these were mixed was slightly stopped. The acid attacked the indigo readily, and excited great heat. After twenty-four hours digestion, the indigo was dissolved, but the mixture was opaque and black: by the addition of water it was rendered clear, passing successively through the various shades of blue, in proportion to the quantity of water. At least twenty pounds of water are required to render the smallest drop of the solution imperceptible, in a cylindrical glass vessel of seven inches diameter. If the sulphuric acid be diluted with water, it attacks only the earthy principle mixed with the indigo, and some mucilaginous particles.

"Several bottles in which a drop of this solution was mixed with liquors containing different substances, as acids, alkalis, and neutral salts, were exposed for some time to a temperature of from fifteen degrees to twenty degrees (65 to 77 Fahr.). In some the colour remained unaltered; in others it became green, and, was destroyed more or less readily. Bergman accounted for the changes he observed, by the property some substances possess of taking away phlogiston, and others of affording it: but they may be happily explained by the attractions of oxygen, which some substances yield, or take away, or acquire from the atmosphere.

"Fixed alkalis saturated with carbonic acid separate from the solution of indigo a very fine blue powder, which is deposited very slowly. Bergman distinguishes this blue powder by the appellation of *precipitated indigo*. It may be obtained also by dropping the solution into alcohol, or into saturated solutions of alum, sulphat of soda, or other salts containing the sulphuric acid; but the liquor remains always in some degree coloured.

"Concentrated *nitric acid* attacks indigo with such violence as to set it on fire. If it be diluted to a proper degree, it acts with less vehemence, the colour of the indigo becomes rusty, and the residuum, which amounts only to one-third of the indigo employed, has the appearance of umber. Fixed alkali precipitates from the nitric acid which has acted on the indigo, a little oxyd of iron, mixed with barytes and calcareous earth: but if too much alkali be added, a part of the precipitate is redissolved, and the colour of the liquor becomes deeper than before.

"Bergman says, that the nitrous acid which has been *phlogisticated* by indigo, and has at the same time taken up a portion of its mucilage, may be employed for dyeing wool or silk

of different shades, of a very permanent yellow: but here that great chemist mistakes for a particular effect, the action always exerted by nitric acid on wool or silk, to which it gives a yellow colour, more or less deep according to its degree of concentration, and which he has himself described in his notes on Scheffer's essay on dyeing.

"Mr. Hauffman has given a more regular series of observations on the changes produced in indigo by nitric acid, in his interesting "*Dissertation sur l'indigo & ses dissolvants*, inserted in the *Journal de Physique* for March 1788. After all the indigo which he had exposed to the action of that acid appeared to be destroyed, he found in the vessel a coagulum, which, being perfectly freed from nitric acid by washing, formed a brown viscous mass, having all the appearance of a gummy resinous substance: it was soluble in alcohol, which indigo is not, and was not soluble in water, except in a large quantity, though more so in hot water than in cold: and it was very bitter to the taste. The water with which the coagulum had been washed, yielded on evaporation small crystals, which exhibited many properties of the tartarous and oxalic acids, but the nature of which our author did not precisely ascertain.

"*Muriatic acid*, digested and even boiled on indigo, takes up the earthy part, the iron, and a little extractive matter, which colours it of a yellowish brown, but has not the least action on the blue colour. If the indigo be precipitated from sulphuric acid, the muriatic acid will readily dissolve a certain portion of it, and form a deep blue liquor.

"The other acids, as the *tartarous*, *formic*, *acetic*, and *phosphoric*, act on indigo like the muriatic; they dissolve precipitated indigo very well. Sulphuric acid too much diluted with water to dissolve indigo, and nitric acid also when too weak to decompose it, dissolve only the earthy part and the extractive matter, which are altogether foreign to the colouring substance.

"The *oxygenated muriatic acid* shews little action on indigo in substance, but destroys its colour when in a state of solution. I employed the solution in sulphuric acid to ascertain the alterations it would induce in it. With this I mixed oxygenated muriatic acid, till its blue colour was entirely destroyed: it was then of a brown yellow. In this state I evaporated it, and a blackish viscous substance was gradually deposited, which appeared to be of the same nature as that Mr. Hauffman obtained by means of the nitric acid.

"This effect of the oxygenated muriatic acid on the solution of indigo in sulphuric acid, affords a very accurate method of determining the goodness of indigo. All the colouring particles contained in it are soluble in the sulphuric acid, and form perfectly similar solutions; for there is no difference between the colouring particles. The relative quantities therefore of these particles contained in different specimens of indigo may be found, by the proportions of oxygenated muriatic acid required to destroy the colouring particles extracted by sulphuric acid from equal weights." In the second section of the first part of his work, M. Berthollet mentions the precautions necessary in making this experiment.

"Pure or *caustic fixed alkali* dissolves some substances foreign to the colouring matter of indigo, but acts little on the colouring matter itself. Caustic volatile alkali, or *ammoniac*, acts nearly in the same manner. Precipitated indigo dissolves readily without heat, in alkalis, fixed or volatile. If they be pure or caustic, the blue colour changes gradually to a green, and is at length destroyed: but if they be combined with carbonic acid the colour is not altered. Lime-water has little action on indigo itself, but it dissolves precipitated indigo. This solution changes its colour, which is ultimately destroyed, nearly in the same manner as those in caustic alkalis.

"Indigo exposed to the action of *fire* in an open crucible, or

under a muffle, fumes, swells, grows red, and sometimes takes fire, emitting a white flame. A hundred parts of indigo leave thirty-three or thirty-four parts of ashes. These ashes afford no fixed alkali when lixiviated with distilled water. Muriatic acid dissolves the greater part of them with a slight effervescence: the residuum, which is insoluble, constitutes an eleventh part, and has the characters of siliceous earth.

"The solution in muriatic acid produces prussian blue, on mixing with it prussiat of pot-ash. From thirty to thirty-two grains (25 to 27 English) are obtained from the ounce of indigo. Bergman concluded that the ounce contained eighteen or twenty grains (15 or 16) of iron; but he has ascertained in various subsequent works, that prussian blue formed by means of prussiat of pot-ash, contained only about a sixth of its weight of iron; so that from the above experiment we should reckon only five or six grains (4 or 5) in the ounce.—Beside the iron and siliceous earth, the ashes contain calcareous earth and barytes.

"Indigo detonates strongly with *nitre*. In distillation it affords carbonic acid, a liquor containing a little volatile alkali, and an oil resembling the empyreumatic oil of tobacco, and readily soluble in alcohol.

"Bergman concludes from his analysis, that a hundred parts of good indigo contain

Mucilaginous matter separable by means of water	12
Resinous matter soluble in alcohol	6
Earthy matter soluble in acetous acid, which does not attack the iron here in the state of oxyd	22
Oxyd of iron soluble in muriatic acid	13

"The forty-seven parts remaining are almost pure colouring matter, which, distilled alone, affords

Carbonic acid	2
Alkaline liquor	8
Empyreumatic oil	9
Coal	23

"The coal burnt in the open air gave four parts of earth, about half of which was oxydated iron, and the remainder a very fine siliceous powder.

"From these results, that great chemist considers indigo as a substance analogous to prussian blue, and the colouring parts of ink. He thinks that, like those substances, it owes its colour to iron: but it has been shewn that the method used by him to calculate the iron contained in it exaggerated its quantity. Besides, we should reckon only that iron which enters into the composition of the colouring matter; for that which the muriatic acid can dissolve without attacking the colouring matter, ought to be considered as a foreign substance, as well as the earths and extractive and resinous matters, the quantities of which vary greatly in different kinds of indigo. Now, from forty-seven parts of pure indigo Bergman obtained only two parts of oxyd of iron, which owes at least a fourth of its weight to oxygen. Hence it follows, that iron cannot be reckoned more than a thirtieth part in the composition of the colouring matter of indigo, the properties of which, moreover, appear to have but a very slight relation to those of prussian blue, and the colouring parts of ink. Iron then can have but little influence in producing the colour of indigo.

"It is known at present that most of the principles obtained by distillation, as oil, carbonic acid, and ammoniac, did not exist in the substance from which they are disengaged by heat; but that they are new combinations, owing to principles which by their union formed the original substance. Thus, there is neither oil nor ammoniac in indigo: but from the products of its analysis we may conclude, that it contains a pretty considerable quantity of hydrogen, a little azot, a very small quantity of iron, but, above all, such a proportion of coal as is obtainable

from no other known vegetable substance, since forty-seven grains of pure indigo left twenty-three of coal, from which, it is true, we are to subtract four grains of ashes; but then, on the other hand, we must add the coaly matter contained in the oil, in the carbonic acid, and in the carbonic hydrogenous gas, which was no doubt disengaged in the operation. Other experiments will shew, that oxygen really exists in indigo, without forming such an intimate combination as when it enters into the composition of water. As to the siliceous earth, it does not appear whether it be a component part of the colouring matter, or simply mixed with it.

"The great quantity of coal and of hydrogen which enter into the composition of indigo, accounts for its prompt inflammability, and the brisk detonation it produces with nitre. The nitric and oxygenated muriatic acids appear to me to produce the blackish viscous substance before mentioned, by forming water from a combination of their oxygen with the greater part of the hydrogen of the indigo, so that the coaly matter remains combined with only a very small portion of hydrogen."

In the first part of the *Elements of the Art of Dyeing*, M. Berthollet has exhibited reasons which, in his opinion, amount to a proof, that the fixity and unchangeableness of colours are chiefly owing to the proportion of fixed principles which enter into the composition of the colouring matter, and the abundance of coal, which, combining with oxygen less readily than hydrogen does, gives them the property of resisting the action of the air.

"In indigo (continues he) we find this abundance of coal, which must render its colour fixed and unchangeable. Forty-seven parts of pure indigo left on distillation twenty-three of coal, in Bergman's experiments: and Mr. Quatremere says, that four ounces of indigo yielded him two ounces and a half of coal. If we turn our attention to the preparation by which it is extracted, or rather formed, it appears, that the substance to which it owes its origin must have been of a resinous nature when in the organized plant: that in the preparation it has undergone, in the kind of putrefaction it has experienced, a part of its hydrogen has been consumed by a slow combustion, during which a gas escaped: and that the chief use of the beating was to favour the contact and action of the air. This theory is confirmed by the circumstances which accompany the beating: if it be continued too long, the indigo is changed, blackened, and becomes what is called burnt indigo.

"Indigo has not indeed the brown or fawn colour, which most commonly indicates that combustion of which I have laid down the theory: but I have remarked, that this colour is not an inseparable effect of it, for colours are influenced by slight circumstances: besides, a deep blue approaches considerably the proper colour of coal.

"I have advanced, that when colouring matter like that of flax underwent a slight combustion, a small portion of oxygen remained united with it, without combining particularly either with the hydrogen or with the coal, and that hence arose some of its qualities. It appears that we find in indigo this property, which remains to be examined; and from this it is, that the putrefaction, or rather combustion, which it undergoes in its preparation, must have a certain limit, which if exceeded, the indigo is rendered of bad quality.

"It has been seen that indigo is not naturally soluble, either by alkalis or lime; yet, in the processes employed, it is dissolved by those substances, from which it is afterwards precipitated on the matter to be dyed. The solution of indigo by lime or alkali is greenish. At the surface it becomes blue, because there the indigo is precipitated in its natural state. The green colour is not produced by the alkalis, as it is in many other blue vegetable substances, as Bergman observes: for these, when rendered green, recover their colour as soon as the alkali is saturated with

an acid, which of itself would give them a red colour : but an alteration of the colouring matter of indigo was requisite to its solution in an alkali, and acids have not the property of making it red. It remains to enquire what change the indigo experiences previous to its solution in alkalis."

Bergman examines two processes, to deduce from them the cause of the changes produced in the indigo. We have already treated of these as operations of the dyer (see DYEING). At present it is sufficient merely to mention them.

"If sulphat of iron (observes M. Berthollet) be mixed in water with an equal weight of indigo, and double its weight of lime, the indigo soon dissolves : but Bergman has observed, that if the sulphat of iron be boiled for some hours in a large portion of water, afterwards reduced to a proper quantity by evaporation, the solution would not take place. If a solution of pure or caustic fixed alkali be taken, and to this indigo and sulphuret of arsenic or orpiment be added, the bath soon becomes green, and the indigo is dissolved. If instead of the sulphuret of arsenic we substitute the portion of arsenic it contains, the bath will never be fit for dyeing ; but on adding the quantity of sulphur it ought to contain, we shall soon see marks of solution.

"Bergman attributes these effects to phlogiston, communicated to the indigo in the first instance by the precipitate of iron, in the second by the orpiment, by means of which it is rendered soluble by the alkali and the lime ; so that when the precipitate of iron has been deprived of its phlogiston by a long ebullition, it is unable to occasion a solution of the indigo, because it is no longer capable of affording it phlogiston.

"In this explanation we have only to make those alterations which are pointed out by the improvements made in physics. Indigo contains a portion of oxygen, which may be taken from it by substances that have a strong attraction for it, and then it becomes soluble by lime and alkalis. The fresh precipitate of sulphat of iron is a substance of this kind : for it is known from the experiments of Dr. Priestley, that this precipitate combines with vital air with which it is placed in contact, whilst its green colour changes to a red, and then to a yellow ; but by a long ebullition the iron combines with more and more oxygen, and at length becomes saturated with it, thus being rendered incapable of taking it from the indigo. Sulphuret of arsenic also, when dissolved in an alkali, has a strong attraction for oxygen ; but the oxyd of arsenic has a very slight tendency to combine with that principle.

"Mr. Hauffman has proved by a direct experiment, that the solution of sulphuret of arsenic mixed with indigo absorbed vital air, with which it was in contact : for, having put some of that solution, known in the dye-house by the name of *printing blue*, in contact with air obtained by distilling nitre, seven-eighths of the air were absorbed, and the residuum was found to be azotic gas. The printing blue was entirely spoilt, and the indigo was regenerated : a portion of the alkali united with the sulphuric acid produced, and formed with it, sulphat of pot-ash : there remained some caustic alkali ; and the arsenic, instead of being in the metallic state, as it is in the sulphuret of arsenic, was combined with it in the state of oxyd. Perhaps Mr. Hauffman would have found, that a part of the arsenic was in the state of an acid, had he pursued his enquiries with more accuracy.

"Though, with respect to the theory of this observation, Mr. Hauffman remains undecided whether to adopt the phlogistic hypothesis, or the natural explanation which attributes the phenomena just described to the absorption of air and the combination of oxygen, no doubts of the validity of the latter can remain at present, when it is known that the air obtained from nitre is composed of vital air, and a more or less considerable proportion of azotic gas or phlogisticated air, according to

the degree to which the decomposition of the nitre has been carried. The azotic gas, which Mr. Hauffman found as a residuum, was pre-existent then, and had no share in producing the phenomenon : the vital air was simply absorbed by the sulphur, which was converted into sulphuric acid : it combined also with the arsenic, reducing it to the state of oxyd, and perhaps even of an acid ; while a portion of it united likewise with the indigo dissolved by the caustic alkali : hence the indigo resumed its blue colour, and its natural state ; the caustic alkali was no longer capable of acting on it ; and it was precipitated : circumstances perfectly analogous to those which take place in the solution of indigo produced by means of sulphat of iron.

"It follows from what has been said, 1st, that indigo in its natural state contains oxygen : 2dly, that while it retains this oxygen it is incapable of uniting with alkalis or lime : 3dly, that substances capable of depriving it of this portion of oxygen render it soluble by lime and alkalis : 4thly, that this solution is decomposed, and the indigo resumes its natural state, when it comes into contact with atmospheric air, and attracts the oxygen of which it had been deprived. The very same things happen when any substance is dyed in the indigo vat. In the vat it acquires a green colour ; but when it is exposed to the air it becomes blue, because the indigo recombines with the oxygen it attracts from the atmosphere, by which it is restored to its natural state, and the lime or alkali is set at liberty : the latter being carried off in the washing, the indigo remains combined with the substance, which is found to be dyed by its means. I have found, that a pattern of cloth, or cotton, coming green out of the vat, acquired in like manner a blue colour, by dipping it quickly into oxygenated muriatic acid, sufficiently diluted not to decompose the indigo.

"With respect to Mr. Hauffman's experiment I shall observe, that the sulphuret of alkali and of arsenic acts much more powerfully on oxygen than the simple sulphuret of alkali ; which may be owing to two causes : 1st, the arsenic, which in the sulphuret of arsenic is in the metallic state, or very slightly oxydated, may itself act on the oxygen : or 2dly, the union of the sulphur and alkali may not be so intimate in the triple compound of alkali, arsenic, and sulphur, as in the more simple sulphuret, composed of sulphur and alkali only ; so that the sulphur existing in a state of equal division may act more strongly on the oxygen.

"However this may be, on the more powerful action exerted on oxygen by the sulphur of alkali and of arsenic depends the more striking effect it produces on wines that contain lead ; because it thereby reduces nearer to the metallic state the oxyd of lead, which thence acquires a blacker colour.

"It has been seen, that indigo underwent from the action of the nitric and oxygenated muriatic acids a combustion, in which its hydrogen was alone, or at least principally, destroyed. Sulphuric acid, in dissolving it, appears also to produce a slight combustion, which is perceived by the smell of sulphureous acid, however gentle the heat by which the solution is effected. If the heat employed be a little too great, the signs of combustion are very evident. To this alteration I attribute the changes observed by Bergman in the indigo precipitated from sulphuric acid. Thus, pure alkali and lime dissolve the precipitate, render it green, and soon destroy its colour, so as not to be recoverable by acids, because, as I have shewn, they favour the progress of the combustion. If the liquor which is deprived of its colour were evaporated, a residuum of the nature of that left by the nitric and oxygenated muriatic acids would probably be obtained.

"Indigo, when it has undergone a slight alteration from the sulphuric acid, does not adhere so strongly to wool or silk, as when it is in its natural state. Hence the *saxon blue*, pro-

duced by a solution in sulphuric acid, is less permanent than the blue of the indigo vat; and that solution is capable of giving only a slight dye to silk, and a still slighter to thread or cotton.

"If we attend to the properties acquired by indigo when deprived of a portion of its hydrogen, as it is by the oxygenated muriatic acid, it will not be difficult to explain the greater part of the observations made by Bergman on different mixtures with solution of indigo.

"Mr. Haussman has observed, that the sulphuret of antimony, or crude antimony, promoted the solution of indigo, in the same manner as sulphuret of arsenic; but that the oxyd of antimony mixed with sulphur would not produce the same effect. He remarked, that the solution of indigo by means of sulphuret of antimony could not be used as a *printing blue*, because the antimony was precipitated in a red state, probably remaining combined with a little sulphur. Other metallic sulphurets did not succeed with him; because, as he observes, they are not soluble in caustic alkali."

Mr. Haussman, it appears, has made many other interesting observations, which Mr. Berthollet is not yet able to explain in a satisfactory manner. He digested a mixture of iron filings reduced to a fine powder, indigo ground with water, and concentrated caustic alkaline liquor, without being able to dissolve the colouring substance: but a very good solution was procured by means of antimony in its metallic state. The oxyds of antimony appeared to have no action on it; and zinc, though it acts strongly on oxygen, produced no solution.

The precipitate of copper with indigo exhibited to him some peculiar phenomena. Far from contributing to its solution, it effected its regeneration from all the different arsenical antimonial solutions, as well as from that obtained by means of precipitate of iron. The solution of copper in ammoniac produces the same effect. He says, that the dyers avail themselves of this property of copper, more readily to exhaust the blue vats, which, from having been too long in use, or containing originally too little indigo, give but very weak shades; but on dipping the goods to be dyed into a water very slightly impregnated with sulphat of copper, or other coppery solution, whether acid or alkaline, deeper shades of colour are readily produced.

INDIVIDUAL, a particular being of any species, or that which cannot be divided into two or more beings equal or alike. The usual division in logic is made into *genera*, or into *genuses*; those *genera* into *species*; and those *species* into *individuals*.

INDIVISIBLE, among metaphysicians. A thing is said to be absolutely *indivisible*, that is a simple being, and consists of no parts into which it may be divided. Thus, God is *indivisible* in all respects; as is also the human mind; not having extension, or other properties of body.

INDIVISIBLES, in geometry, the elements or principles into which any body or figure may be ultimately resolved; which elements are supposed to be infinitely small: thus, a line may be said to consist of points, a surface of parallel lines, and a solid of parallel and similar surfaces.

INDORE, or **ENDORE**, a modern city of Hindoostan Proper, capital of a territory in the province of Malwa, subject to one of the Poonah Mahratta chiefs. It is 30 miles S. of Ougain. E. lon. 76. 5. N. lat. 24. 31.

INDORSEMENT, in law, any thing written on the back of a deed; as a receipt for money received. There is likewise an *indorsement*, by way of assignment, on bills of exchange and notes of hand; which is done by writing a person's name on the back thereof.

INDOSTAN, or **HINDOOSTAN PROPER**, **INDIA**, or *the Empire of the Great Mogul*. See **HINDOOSTAN**.

INDRE, a department of France, which includes the late province of Berry. It has its name from a river, which rises

in this department, and, passing into that of Indre and Loire, falls into the Loire between Chinon and Saumur. Chateauroux is the capital.

INDRE and LOIRE, a department of France, which includes the late province of Touraine. Tours is the capital.

INDUCTION, in logic and rhetoric, a consequence drawn from several propositions or principles first laid down. See **LOGIC** and **ORATORY**.

INDUCTION, in law, is putting a clerk or clergyman in possession of a benefice or living to which he is collated or presented. See the article **PARSON**. Induction is performed by a mandate from the bishop to the archdeacon, who usually issues out a precept to other clergymen to perform it for him. It is done by giving the clerk corporal possession of the church, as by holding the ring of the door, tolling a bell, or the like; and is a form required by law, with intent to give all the parishioners due notice and sufficient certainty of their new minister, to whom their tythes are to be paid. This therefore is the investiture of the temporal part of the benefice, as institution is of the spiritual. And when a clerk is thus presented, instituted, and inducted into a rectory, he is then, and not before, in full and complete possession; and is called in law *persona impersonata*, or *parson impersonée*.

INDULGENCES, in the Romish church, are a remission of the punishment due to sins, granted by the church, and supposed to save the sinner from purgatory. According to the doctrine of the Romish church, all the good works of the saints over and above those which were necessary towards their own justification, are deposited, together with the infinite merits of Jesus Christ, in one inexhaustible treasury. The keys of this were committed to St. Peter, and to his successors the popes, who may open it at pleasure, and, by transferring a portion of this superabundant merit to any particular person, for a sum of money, may convey to him either the pardon of his own sins, or a release for any one in whom he is interested, from the pains of purgatory. Such indulgences were first invented in the 11th century, by Urban II. as a recompense for those who went in person upon the glorious enterprise of conquering the Holy Land. They were afterwards granted to those who hired a soldier for that purpose; and in process of time were bestowed on such as gave money for accomplishing any pious work enjoined by the pope.

The power of granting indulgences has been greatly abused in the church of Rome. Pope Leo X. in order to carry on the magnificent structure of St. Peter's at Rome, published indulgences, and a plenary remission, to all such as should contribute money towards it. Finding the project take, he granted to Albert elector of Mentz, and archbishop of Magdeburg, the benefit of the indulgences of Saxony and the neighbouring parts, and farmed out those of other countries to the highest bidders; who, to make the best of their bargain, procured the ablest preachers to cry up the value of the ware. The form of these indulgences was as follows: "May our Lord Jesus Christ have mercy upon thee, and absolve thee by the merits of his most holy passion! And I, by his authority, that of his blessed apostles Peter and Paul, and of the most holy Pope, granted and committed to me in these parts, do absolve thee, first from all ecclesiastical censures, in whatever manner they have been incurred: then from all thy sins, transgressions, and excesses, how enormous soever they may be, even from such as are reserved for the cognizance of the holy see, and as far as the keys of the holy church extend: I remit to you all punishment which you deserve in purgatory on their account; and I restore you to the holy sacraments of the church, to the unity of the faithful, and to that innocence and purity which you possessed at baptism; so that, when you die, the gates of punishment shall be shut, and the gates of the paradise of delight shall

be opened : and if you shall not die at present, this grace shall remain in full force when you are at the point of death. In the name of the Father, and of the Son, and of the Holy Ghost."

The terms in which the retailers of indulgences described their benefits and the necessity of purchasing them, are so extravagant, that they appear almost incredible. If any man (said they) purchases letters of indulgence, his soul may rest secure with respect to its salvation. The souls confined in purgatory, for whose redemption indulgences are purchased, as soon as the money tinkles in the chest, instantly escape from that place of torment, and ascend into heaven. That the efficacy of indulgences was so great, that the most heinous sins, even if one should violate (which was impossible) the mother of God, would be remitted and expiated by them, and the person be freed both from punishment and guilt. That this was the unspeakable gift of God, in order to reconcile men to himself. That the cross erected by the preachers of indulgences was equally efficacious with the cross of Christ itself. "Lo! the heavens are open; if you enter not now, when will you enter? For twelve pence you may redeem the soul of your father out of purgatory; and are you so ungrateful, that you will not rescue your parent from torment? If you had but one coat, you ought to strip yourself instantly, and sell it, in order to purchase such benefits," &c.

It was this great abuse of indulgences that contributed not a little to the first reformation of religion in Germany, where Martin Luther began first to declaim against the preachers of indulgences, and afterwards against indulgences themselves: but since that time the popes have been more sparing in the exercise of this power: however, they still carry on a great trade with them to the Indies, where they are purchased at two rials a-piece, and sometimes more:

The pope likewise grants indulgences to persons at the point of death; that is, he grants them, by a brief, power to choose what confessor they please, who is authorized thereby to absolve them from all their sins in general.

INDULT, in the church of Rome, the power of presenting to benefices granted to certain persons by the pope. Of this kind is the indult of kings and sovereign princes in the Romish communion, and that of the parliament of Paris granted by several popes. By the concordat for the abolition of the pragmatic sanction, made between Francis I. and Leo X. in 1516, the French king had the power of nominating to bishoprics, and other consistorial benefices, within his realm. At the same time, by a particular bull, the pope granted him the privilege of nominating to the churches of Brittany and Provence. In 1648 pope Alexander VIII. and in 1668 Clement IX. granted the king an indult for the bishoprics of Metz, Toul, and Verdun, which had been yielded to him by the treaty of Munster; and in 1668 the same pope Clement IX. granted him an indult for the benefices in the counties of Roussillon, Artois, and the Netherlands. The cardinals likewise have an indult granted them by agreement between pope Paul IV. and the sacred college in 1555, which is always confirmed by the popes at the time of their election. By this treaty the cardinals have the free disposal of all the benefices depending on them, and are empowered likewise to bestow a benefice *in commendam*.

INDULTO, a duty, tax, or custom, paid to the king of Spain for all such commodities as are imported from the West Indies in the galleons.

INDUS, or SINDE, a great river of Hindoostan Proper, called by the natives Sinde, or Sindeh. It is formed of about ten principal streams, which descend from the Persian and Tartarian mountains; but, according to major Rennell, the sources of these streams must be far more remote than the sides of these mountains. From the city of Attock, in about lat.

32. 27. downward to Moultan, to the conflux of the Jenaub, or Chunaub, it is commonly named the river of Attock. Below the city of Moultan, it proceeds in a S. W. direction, through the province of that name, and that of Sindy, and enters the Arabian Sea, by several months, N. W. of the gulf of Outch.

INEBRIANTS, are defined to be such things as affect the nerves in a particular and agreeable manner, and through them alter and disturb the functions of the mind. They are properly divided into native and artificial; the former chiefly in use among the oriental and other nations, the latter principally throughout Europe.

Natural Inebriants, are, 1. Opium; in use all over the East, and of which the Turks, through custom, swallow largely. 2. Peganum harmala, Syrian rue. The seeds are sold in Turkey for this purpose; and with these, as Bellonius relates, the Turkish emperor Solyman kept himself intoxicated. 3. Maslac of the Turks, or bangué of the Persians; prepared from the dust of the male flower of hemp, or from the leaves. 4. Bangué of the Indians, from the leaves of the hibiscus sabdariffa. 5. Seeds of various species of the datura, or thorny apple. 6. Pinang, or betel of the Indians. 7. Roots of black henbane. 8. The hyoscyamus physaloides. 9. Berries of the deadly nightshade. 10. Leaves of millfoil, are used by the Dalecarlians to render their beer intoxicating. 11. Tobacco, and severals others less material are mentioned; such as clary, saffron, and darnel.

Artificial Inebriants, are fermented liquors from farinaceous seeds; wines, and spirits drawn by distillation. With these is ranked the nectar of the gods, and the anodyne medicine of Homer, commonly called *nepenthes*; and the spells by which Medea and Circe produced their enchantments.

INERTIA of MATTER, in philosophy, is defined by Sir Isaac Newton to be a passive principle by which bodies persist in their motion or rest, receive motion in proportion to the force impressing it, and resist as much as they are resisted. It is also defined by the same author to be a power implanted in all matter, whereby it resists any change endeavoured to be made in its state. See MECHANICS.

INESSE is applied to things which are actually existing. Authors make a difference between a thing *in esse*, and a thing *in posse*: a thing that is not, but may be, they say is *in posse*, or *potentia*; but a thing apparent and visible, they say is *in esse*, that is, has a real being *eo instanti*; whereas the other is casual, and at best but a possibility.

INFALISTACIO, an ancient punishment of felons, by throwing them among the rocks and sands, customarily used in port towns. It is the opinion of some writers, that *infalistas* did imply some capital punishment, by exposing the malefactor upon the sands till the next tide carried him away; of which custom, it is said, there is an old tradition. However, the penalty seems to take its name from the Norman *falese*, or *falefia*, which signified not the sands, but the rocks and cliffs adjoining, or impending on the sea-shore. *Commisit feloniam, ob quam fuit suspensus, utlegatus, vel alio modo morti damnatus, &c. vel apud Dover infalistas, apud Southampton submersus, &c.*

INFALLIBLE, something that cannot err, or be deceived. One of the great controversies between the Protestants and Papists, is the infallibility which the latter attribute to the pope; though, in fact, they themselves are not agreed on that head, some placing this pretended infallibility in the pope and a general council.

INFAMY, in law, is a term which extends to forgery, perjury, gross cheats, &c. by which a person is rendered incapable of being a witness or juror, even though he is pardoned for his crimes.

INFANCY, the earliest period of human life. Fred. Hoffman says, that the human species are *infants* until they begin

to talk, and *children* to the age of puberty. Anatomy discovers to us, that during infancy there is much imperfection in the human frame; *e. g.* its parts are disproportioned, and its organs incapable of those functions which in future life they are designed to perform. The head is larger in proportion to the bulk of the body than that of an adult. The liver and pancreas are much larger in proportion than in advanced life; their secretions are more in quantity also. The bile is very inert; the heart is stronger and larger than in future life; the quantity of blood sent through the heart of an infant, in a given time, is also more in proportion than in adults. Though these circumstances have their important usefulness, yet the imperfection attending them subjects this age to many injuries and dangers from which a more perfect state is exempted. Dr. Percival observes, in his *Essays Medical and Experimental*, that of all the children who are born alive, two thirds do not live to be two years old.

Infants have a larger proportion of brain than adults, hence are most subject to spasmodic disorders; and hence the diagnostics of diseases are in many respects obscure or uncertain, as particularly those taken from the pulse, which, from the irritability of the tender bodies of infants, is suddenly affected by a variety of accidents too numerous, and seemingly too trivial, to gain our attention. However, no very great embarrassment arises to the practitioner from hence; for the disorders in this state are generally acute, less complicated than those in adults, and are more easily discovered than is generally apprehended.

INFANT, denotes a young child. See the article INFANCY. Infants, amongst the Jews, Greeks, and Romans, were swaddled as soon as they were born, in a manner similar to that practised by the moderns. The Jews circumcised and named their infant children on the eighth day from the birth. Upon the birth of a son, the Grecians crowned their doors with olive—of a daughter, with wool. The infant was washed in warm water, and anointed with oil—by the Spartans with wine; it was then dressed, and laid in a basket, or on a shield if the father was a warrior, particularly amongst the Spartans. At five days old they ran with it round the fire, and the mother's relations sent presents. The Greeks named their children on the tenth day, the Romans on the ninth: the naming was attended with sacrifices and other demonstrations of joy. The maternal office of suckling their own children was never declined, when circumstances would permit. How much different is this from the unnatural delicacy observed by modern mothers, a delicacy which to the child is cruelty! The 40th day was a day of solemnity for the mother. The names of children were registered both by the Greeks and Romans. See REGISTER.

For an account of the custom of exposing infants, see EXPOSING.

Infants were kept from crying in the streets by means of a sponge soaked in honey. Nurses had also their bugbears and terrible names to frighten the children into peace:—The figure with which they were principally intimidated was *Μορμολυκειον*, a sort of raw head and bloody-bones.

INFANT, in law, is a person under 21 years of age; whose capacities, incapacities, and privileges, are various.

1. In *criminal* matters. The law of England does in some cases privilege an infant under the age of 21, as to common misdemeanours; so as to escape fine, imprisonment, and the like: and particularly in the cases of omission, as not repairing a bridge, or a highway, and other similar offences; for, not having the command of his fortune till the age of 21, he wants the capacity to do those things which the law requires. But where there is any notorious breach of the peace, a riot, battery, or the like, (which infants when full grown are at least as liable as others to commit); for those, an infant above

the age of 14 is equally liable to suffer, as a person of the full age of 21.

With regard to capital crimes, the law is still more minute and circumspect; distinguishing with greater nicety the several degrees of age and discretion. By the ancient Saxon law, the age of twelve years was established for the age of possible discretion, when first the understanding might open: and from thence till the offender was 14, it was *etas pubertati proxima*, in which he might, or might not, be guilty of a crime, according to his natural capacity or incapacity. This was the dubious stage of discretion: but under twelve, it was held, that he could not be guilty in will, neither at fourteen could be supposed innocent, of any capital crime which he in fact committed. But by the law, as it now stands, and has stood at least ever since the time of Edward III. the capacity of doing ill, or contracting guilt, is not so much measured by years and days, as by the strength of the delinquent's understanding and judgment. For one lad of 11 years old may have as much cunning as another of 14; and in these cases our maxim is, that *malitia supplet aetatem*. Under seven years of age, indeed, an infant cannot be guilty of felony; for then a felonious discretion is almost an impossibility in nature: but at eight years old he may be guilty of felony. Also, under 14, though an infant shall be *prima facie* adjudged to be *doli incapax*, yet if it appear to the court and jury that he was *doli capax*, and could discern between good and evil, he may be convicted and suffer death. Thus a girl of 13 has been burnt for killing her mistress: and one boy of ten, and another of nine years old, who had killed their companions, have been sentenced to death, and he of ten years actually hanged; because it appeared upon their trials, that the one hid himself, and the other hid the body he had killed; which hiding manifested a consciousness of guilt, and a discretion to discern between good and evil. And there was an instance in the last century, where a boy of eight years old was tried at Abington for firing two barns; and, it appearing that he had malice, revenge, and cunning, he was found guilty, condemned, and hanged accordingly. Thus also, in very modern times, a boy of ten years old was convicted on his own confession of murdering his bedfellow. There appearing in his whole behaviour plain tokens of a mischievous disposition; and as the sparing this boy merely on account of his tender years might be of dangerous consequence to the public, by propagating a notion that children might commit such atrocious crimes with impunity, it was unanimously agreed by all the judges, that he was a proper subject of capital punishment. But, in all such cases, the evidence of that malice which is to supply age, ought to be strong and clear beyond all doubt and contradiction.

2. In *civil* matters. The ages of male and female are different for different purposes. A male at 12 years old may take the oath of allegiance; at 14 is at the years of discretion, and therefore may consent or disagree to marriage, may choose his guardian, and, if his discretion be actually proved, may make his testament of his personal estate; at 17 may be an executor; and at 21 is at his own disposal, and may alienate his lands, goods, and chattels. A female also at seven years of age may be betrothed or given in marriage; at nine is entitled to dower, at 12 is at years of maturity, and therefore may consent or disagree to marriage, and, if proved to have sufficient discretion, may bequeath her personal estate; at 14 is at years of legal discretion, and may choose a guardian; at 17 may be executrix; and at 21 may dispose of herself and her lands. So that full age in male or female is 21 years, which age is completed on the day preceding the anniversary of a person's birth; who till that time is an infant, and so styled in law. Among the ancient Greeks and Romans, women were never of age, but subject to perpetual guardianship, unless when married, *nisi convinctum in matrimonium viri*: and, when that

perpetual tutelage wore away in process of time, we find that, in females as well as males, full age was not till 25 years. Thus by the constitution of different kingdoms, this period, which is merely arbitrary, and *juris positivi*, is fixed at different times. Scotland agrees with England in this point (both probably copying from the old Saxon constitutions on the continent, which extended the age of minority *ad annum vigesimum primum, et eo usque juvenes sub tutelam reponunt*): but in Naples persons are of full age at 18; in France, with regard to marriage, not till 30; and in Holland at 25.

The very disabilities of infants are privileges; in order to secure them from hurting themselves by their own improvident acts. An infant cannot be sued but under the protection, and joining the name, of his guardian; for he is to defend him against all attacks as well by law as otherwise: but he may sue either by his guardian, or *prochein amy*, his next friend who is not his guardian. This *prochein amy* may be any person who will undertake the infant's cause; and it frequently happens that an infant, by his *prochein amy*, institutes a suit in equity against a fraudulent guardian.

With regard to estates and civil property, an infant hath many privileges. In general, an infant shall lose nothing by nonclaim, or neglect of demanding his right; nor shall any other *laches* or negligence be imputed to an infant, except in some very particular cases.

It is generally true, that an infant can neither aliene his lands, nor do any legal act, nor make a deed, nor indeed any manner of contract, that will bind him. But still to all these rules there are some exceptions: part of which were just now mentioned in reckoning up the different capacities which they assume at different ages: and there are others, a few of which it may not be improper to recite, as a general specimen of the whole. And, first, it is true, that infants cannot aliene their estates; but infant trustees, or mortgagges, are enabled to convey, under the direction of the court of chancery or exchequer, or other courts of equity, the estates they hold in trust or mortgage, to such person as the court shall appoint. Also it is generally true, that an infant can do no legal act: yet an infant, who has an advowson, may present to the benefice when it becomes void. For the law in this case dispenses with one rule, in order to maintain others of far greater consequence: it permits an infant to present a clerk (who, if unfit, may be rejected by the bishop), rather than either suffer the church to be unserved till he comes of age, or permit the infant to be debarred of his right by lapse to the bishop. An infant may also purchase lands, but his purchase is incomplete: for, when he comes to age, he may either agree or disagree to it, as he thinks prudent or proper, without alleging any reason; and so may his heirs after him, if he dies without having completed his agreement. It is, farther, generally true, that an infant, under 21, can make no deed but what is afterwards voidable: yet in some cases he may bind himself apprentice by deed indented or indentured, for seven years; and he may by deed or will appoint a guardian to his children, if he has any. Lastly, it is generally true, that an infant can make no other contract that will bind him: yet he may bind himself to pay for his necessary meat, drink, apparel, physic, and such other necessities; and likewise for his good teaching and instruction, whereby he may profit himself afterwards.

INFANTE, and INFANTA, all the sons and daughters of the kings of Spain and Portugal, except the eldest; the princes being called *infantes*, and the princesses *infantas*.

INFANTRY, in military affairs, the whole body of foot-soldiers, whether independent companies or regiments. The word takes its origin from one of the *infantas* of Spain, who, finding that the army commanded by the king her father had been defeated by the Moors, assembled a body of foot-soldiers,

and with them engaged and totally routed the enemy. In memory of this event, and to distinguish the foot-soldiers, who were not before held in much consideration, they received the name of *Infantry*.

Heavy-armed INFANTRY, among the ancients, were such as wore a complete suit of armour, and engaged with broad shields and long spears. They were the flower and strength of the Grecian armies, and had the highest rank of military honour.

Light-Armed INFANTRY, among the ancients, were designed for skirmishes, and for fighting at a distance. Their weapons were arrows, darts, or slings.

Light INFANTRY, among the moderns, have only been in use since the year 1656. They have no camp-equipage to carry, and their arms and accoutrements are much lighter than those of the infantry. Light infantry are the eyes of a general, and the givers of sleep and safety to an army. Wherever there is found light cavalry, there should be light infantry. They should be accustomed to the pace of four miles an hour, as their usual marching pace, and be able to march at five miles an hour upon all particular occasions. Most of the powers on the continent have light infantry. It is no very long time since light infantry came to be used in the British army; but now every regiment has a company of them, placed on the left, the right being occupied by the grenadiers.

INFATUATE, to prepossess any one in favour of some person or thing that does not deserve it, so far as that he cannot easily be disabused. The word *infatuate* comes from the Latin *fatuus* "fool;" of *fari* "to speak out," which is borrowed from the Greek *φαω*, whence *φαρις*, which signifies the same with *vates* in Latin, or *prophet* in English; and the reason is, because their prophets or priests used to be seized with a kind of madness or folly, when they began to make their predictions, or deliver oracles. The Romans called those persons *infatuati*, who fancied they had seen visions, or imagined the god Faunus, whom they called *fatuus*, had appeared to them.

INFECTION, among physicians. See CONTAGION.

INFERIE, sacrifices offered by the Romans to the *Di Manes*, or the souls of deceased heroes or other illustrious persons, or even any relation or person whose memory was held in veneration. These sacrifices consisted of honey, water, wine, milk, the blood of victims, variety of balsamic unguents, chaplets, and loose flowers. The victims upon these occasions were generally of the smaller cattle, though in ancient times they sacrificed slaves or captives: but what a shocking view does this give us of their sentiments of human nature, as if nothing but murder, cruelty, and human blood, could satisfy or prove acceptable to an human soul! The sacrifices were usually black and barren. The altars on which they were offered were holes dug in the ground. The honey, water, wine, &c. were used as libations, and were poured on the tombs of children by children, on those of virgins by virgins, and on those of married men by women. The *inferie* were offered on the 9th and 30th days after interment amongst the Greeks, and repeated in the month Anthesterion. The whole of this article applies equally to the Greeks and the Romans.

INFIBULATION, in antiquity. It was a custom among the Romans to infibulate their singing boys, in order to preserve their voices: for this operation, which prevented their retracting the prepuce over the glans, and is the very reverse to circumcision, kept them from injuring their voices by premature and preposterous venery; serving as a kind of padlock, if not to their inclinations, at least to their abilities. It appears by some passages in Martial, that a less decent use was made of infibulation among the luxurious Romans: for some ladies of distinction, it seems, took this method of confining their passions to their own embraces. Juvenal also hints at some such practice. Celsus, a chaste author, says infibulation was some-

times praised for the sake of health, and that nothing destroys it more than the silly practice this operation seems intended to prevent. The method of doing it is this: The skin which is above the glans is to be extended, and marked on both sides with ink, where it is perforated, and then suffered to retract itself. If the marks recur upon the glans, too much of the skin has been taken up, and we must make the marks farther; if the glans remain free from them, they show the proper place for affixing a fibula: then pass a needle and thread through the skin where the marks are, and tie the threads together; taking care to move it every day, until the parts about the perforations are cicatrised: this being effected, take out the thread, and put in the fibula; which the lighter it is the better. Authors have not determined what the fibula of the ancient surgeon was, though, no doubt it was for different purposes. In the present case, the fibula seems to mean a ring of metal, not unlike what the country people put through the noses of swine.

INFIDEL, a term applied to such persons as are not baptized, and that do not believe the truths of the Christian religion. See DEIST.

INFIDELITY, in a general sense, denotes want of faith or belief in regard to any subject or transaction. The term however is most usually understood of religious infidelity, which signifies a disbelief of Christianity.

“Of all the methods (says Mr. Knox in his Essays) which the vanity of man has devised with a view to acquire distinction, there is none easier than that of professing a disbelief of the established religion. That which shocks the feelings of those with whom we converse, cannot fail of attracting notice; and as the vain are usually confident, they utter their doubts with an air so oracular and decisive, as induces the simple to think them profoundly wise. Audacity, with a little ingenuity, will attract the eyes of spectators; and this will sufficiently answer the purpose of many among the professed unbelievers. One might be diverted, if one were not hurt, at seeing a circle of silly admirers, gaping and fixing their eyes on some half-learned and impudent prater, who throws out oblique insinuations against the bible, the clergy, or the sacrament. These are fertile topics of wit and ingenuity; but it might mortify the vanity of some very vain writers and talkers, if they were to recollect, what is undoubtedly true, that it is a species of wit and ingenuity which not only the vilest, but the most stupid and illiterate of mankind, have frequently displayed in all its possible perfection.

“There is indeed no doubt that vanity is one of the principal causes of infidelity. It must be the sole cause of communicating it to others, by writing or conversation. For let us suppose the case of a very humane, judicious, and learned man, entertaining doubts of the truth of Christianity: if he cannot clear his doubts by examination, he will yet recollect that doubts are no certainties; and, before he endeavours to propagate his scepticism, he will ask himself these questions: “Am I quite convinced that what I doubt of cannot possibly be true? If I am convinced of it, am I sure that the publication of my opinions will not do more harm than good? Is not the disturbing of any long-established civil constitution attended with confusion, rebellion, bloodshed, and ruin? And are not the majority of men more strongly attached to the religion than the government of their forefathers? Will it serve my country to introduce discontent of any species? May not those innovations in religion, which discontent may introduce, lead to all the evils which are caused by phrensy and fanaticism? Granting that I were able to make a party formidable enough to crush opposition and to exterminate Christianity, still am I certain that I act, in this instance, like a good member of society? For is not this system, whether well or ill founded, friendly to society? I must confess

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it; its greatest enemies have acknowledged it. What motive then can induce me to divulge my doubts of its authenticity? Not the good of mankind; for it is already allowed by unbelievers, that the good of mankind is interested in the belief of its divine original. Is it for my own good, and with a view to be convinced? I will not deceive myself: my motive, I suspect, is of another kind; for do I read those books which have been already written to satisfy similar doubts? Nothing but the vanity of appearing to be wiser than my credulous neighbours can induce me to interrupt the happiness of their belief. But vanity of this sort, which tends to disturb society, to injure the national morals, and to rob many thousand individuals of a copious source of sweet and solid comfort, must be pronounced extreme wickedness, even according to the obvious dictates of natural religion. I shall act the part of a good citizen and a good man, by conforming to a system whose beneficial influence I feel and confess, and by endeavouring to acquire a belief in that which has for so many centuries been established, and which promises to soothe me in distress with the sweetest consolations, and to brighten the dismal hour of death by the hope of a more glorious and happy state of existence. At all events, I shall have the satisfaction of having commanded myself so far, as not to have run the hazard of endangering the welfare of my fellow-creatures, either here or hereafter, by indulging a degree of vanity, which, in a creature so weak and so short-lived as myself, is a folly very inconsistent with the superior wisdom which I seem to arrogate.

“I will venture to repeat (continues our author), that all writers against Christianity, however they may affect even the extremes of benevolence, honour, philosophy, and enlargement of mind, are actuated by vanity and wickedness of heart. Their motives are as mean, selfish, narrow, and in every respect unjustifiable, as the tendency of their writings is mischievous. Their malice is often impotent, through the foolish sophistry of their arguments; but, if ever it be successful, it is highly injurious; and indeed, considering their motives and the probable consequences of their endeavours, the infidel writer is a greater enemy to society, and consequently guiltier, according to all the principles of social union, than the thief or the traitor. Persecution would, however, only promote his cause, and his proper punishment is contempt.

“It is certainly no derogation from the character of a man of sense, to conform, even while he is so unfortunate as to doubt their truth, to the opinions of his country. His conformity will probably lead him to a train of actions and of thought, which, in due time, will induce him to believe. But, if that should not happen, yet he will act as very wise and very great men have acted, in paying a respectful deference to the avowed conviction of others. The most intelligent and powerful men of ancient Rome not only appeared to believe a very absurd and hurtful system, but assisted in all its ceremonies as priests. Even Socrates, who evidently entertained some notions adequate to the dignity of the one great and supreme Being, yet thought it was a duty which he owed to his country, so far to conform to the wretched establishment, as to order in his dying words a sacrifice to *Æsculapius*. This external conformity to the national religion ought not to be confounded with hypocrisy. If indeed it is carried to extremes, or zealously affected, it certainly is very blameable and contemptible deceit; but while it keeps within the bounds of reason and moderation, it ought to be called a decent deference to the opinions of the majority, arising from humility, and from a desire to maintain the tranquillity of the state, and to continue an innocent and useful system, which has and will always greatly contribute to lessen the quantity and degree both of moral and of natural evil.

“The easiest, after all, or at least the most effectual method of appearing in any character, is really to be what we wish to appear. But belief, you will say, is not in our power, and how

can we believe what appears to us incredible? Certainly you cannot while it appears incredible. But let me ask you, whether you have taken any pains to believe, or have at once and at a glance persuaded yourself, that the Christian religion is totally false? It is probable that a great number of sceptical writers never gave themselves the trouble to read those scriptures which they warmly oppose. They hear objections, they read objections, and they find, that from men of reputed wit and ingenuity the objections often originate. They also wish to be reputed men of wit and ingenuity, and therefore eagerly adopt the language and sentiments of the order. Perhaps the vanity and pride of this class of men will render all attempts to convince them abortive; but to modest doubters, and to those whose good sense and good dispositions lead them to wish to adopt the religion of their country, it may not be useless to suggest advice, with a view to facilitate their conviction.

"The chief thing required is to free themselves from the pride of human reason. Humility (and surely our blindness and imperfections are sufficient to render us humble, if we would be reasonable), humility will open our hearts, and belief will find admission. Sincere endeavours, seconded by prayers, will never fail to help our unbelief. But, alas! a fine, gay, spirited, liberal, and enlarged modern philosopher would be ashamed to be found on his knees, or with a Testament in his possession. There is scarcely any vicious act, or any vicious book, which would put him so much to the blush.

"A modest well-meaning man might, however, one should think, divest himself of those prejudices which prevent the possibility of belief, by the following soliloquy: 'I find myself placed in a world abounding with evil and misery. Under the immediate pressure of it, I feel my heart inclining, like the needle to the north, by its natural tendency, to the Deity for support. Man, of all animals, is the only one who has the sense of religion. Feeling this distinctive propensity of my nature, I look around to discover to what object, and in what manner, that part of my fellow-creatures who live in the same society with myself pay their adoration. I find a system of religion already established, and which has been established in the most enlightened countries of the earth near 2000 years. I resolve to examine it. It claims that respect from its antiquity and universality. Many difficulties appear on the first inspection. My reason is often startled, and my belief wavers. But I will not yet give up a point of so serious importance, without further and closer attention to it. I reflect, that 2000 years is a vast space in the age of the world. How many myriads of men like myself have lived and died in the faith during that time! And were all of them fools or hypocrites? It could not have been. Can the understanding of a poor individual, just come into the world, and hardly knowing where he is, comprehend on intuition an object of such magnitude, and make the mighty discovery which has escaped millions of the wisest and most learned of mortals? Or, supposing that they all perceived the deception, am I then at last the only honest man who will confess it? I am ashamed to avow such an idea to myself. But yet, if I reject what they received, surely I avow it in the more expressive language of my conduct. Pride, I fear, is the foundation of my scepticism; and humility must form the basis of my belief. I will check my own presumption, and reject the cavils of vain and foolish philosophy. Shall a poor weak creature, who cometh up like a flower, and is cut down, who fleeth as a shadow, and never continueth in one day, presume to pronounce decisively in that little period, in which he has scarcely time to look about him before he dies, against a system which has strong internal and external evidence of divine original, which is most useful and comfortable, and which has been admitted among a great portion of mankind during almost 20 centuries? No: it is the first wisdom to be humble. Humility will be fol-

lowed by grace, and grace by faith, and faith by salvation. It plainly appears, that I can lose nothing by belief, but some of those excessive and irregular enjoyments which would destroy my health and life; but I may possibly gain a glory and a happiness which shall continue to all eternity."

INFINITE, that which has neither beginning nor end: in which sense God alone is infinite. Infinite is also used to signify that which has had a beginning, but will have no end, as angels and human souls. This makes what the schoolmen call *infinitum a parte post*; as, on the contrary, by *infinitum a parte ante*, they mean that which has an end, but had no beginning.

INFINITE Quantities. The very idea of magnitudes infinitely great, or such as exceed any assignable quantities, does include a negation of limits; yet if we nearly examine this notion, we shall find that such magnitudes are not equal among themselves, but that there are really, besides infinite length and infinite area, three several sorts of infinite solidity; all of which are *quantitates sui generis*, and that those of each species are in given proportions. *Infinite-length*, or a line infinitely long, is to be considered either as beginning at a point, and so infinitely extended one way, or else both ways from the same point; in which case the one, which is a beginning infinity, is the one half of the whole, which is the sum of the beginning and ceasing infinity; or, as may be said, of infinity *a parte ante* and *a parte post*, which is analogous to eternity in time and duration, in which there is always as much to follow as is past, from any point or moment of time, nor doth the addition or subtraction of finite length, or space of time, alter the case either in infinity or eternity, since both the one or the other cannot be any part of the whole.

INFINITESIMALS, among mathematicians, are defined to be infinitely small quantities. In the method of infinitesimals, the element, by which any quantity increases or decreases, is supposed to be infinitely small; and is generally expressed by two or more terms, some of which are infinitely less than the rest; which being neglected as of no importance, the remaining terms form what is called the *difference of the proposed quantity*. The terms that are neglected in this manner, as infinitely less than the other terms of the element, are the very same which arise in consequence of the acceleration, or retardation, of the generating motion, during the infinitely small time in which the element is generated; so that the remaining terms express the elements that would have been produced in that time, if the generating motion had continued uniform: therefore those differences are accurately in the same ratio to each other as the generating motions or fluxions. And hence, though in this method infinitesimal parts of the elements are neglected, the conclusions are accurately true without even an infinitely small error, and agree precisely with those that are deduced by the method of fluxions. See FLUXIONS.

INFINITIVE, in grammar, the name of one of the moods, which serve for the conjugation of verbs. See GRAMMAR.

INFINITY, the quality which denominates a thing infinite. See METAPHYSICS.

INFIRMARY, a kind of hospital, where the lame and sickly are properly taken care of.

INFLAMMABILITY, that property of bodies which disposes them to kindle or catch fire. See FIRE, FLAME, PHLOGISTON, &c.

INFLAMMATION, in medicine and surgery, a redness and swelling of any part of the body, attended with heat, pain, and symptoms of fever. See MEDICINE and SURGERY.

INFLAMMATION of Oils by concentrated Acids. See CHEMISTRY, p. 453.

Spontaneous INFLAMMATION; heat and conflagration produced in combustible bodies from adventitious causes. A paper on this subject, which appeared in vol. ii. p. 425 of the Re-

peritory, induced the Rev. Mr. W. Tooke to publish in vol. iii. p. 95 of the same work, some ingenious remarks on that subject :

“ The following observations (says he) on spontaneous inflammations were drawn up, a few years ago, in Russia; they were suggested by an accident which happened on board a frigate lying in the harbour of Cronstadt, of which mention is made in your last number. I was then at Cronstadt, and consequently had an opportunity of procuring an accurate account, not only of the accident itself, but also of the experiments made to ascertain the cause of it. If you think proper to add them to the accounts of spontaneous inflammations which you have already published, you are at liberty to do so.

“ The explication of the causes of spontaneous inflammations in certain substances and compositions, must ever be an object of consequence to the magistracy; as, by discovering the causes of such phænomena, the suspicion of felonious practices in setting fire to buildings may frequently be avoided, and many an innocent person saved from capital punishment. A bare attempt to lessen the number of victims, that may possibly be doomed to bleed at the bar of mistaken justice, can never be thought either frivolous or impertinent.

“ I intentionally pass over the *pyrophori*, at present so well known to chemists, prepared from alum, &c. as not properly belonging to my design, though deserving of notice in explaining the causes of spontaneous inflammation; nor shall I say any thing of those inflammations that happen in the mineral kingdom, in coal-mines, alum-pits, &c. as they are already sufficiently known, and their causes have often been discussed.

“ Of incomparably more importance, and far less known, are the spontaneous inflammations of substances from the animal and vegetable kingdoms; and these are what I design here briefly to bring together: as I firmly believe, that a more extensive publication of these phænomena may prove of general utility to mankind, by lessening the dangers to which they are exposed.

“ A recent instance will serve to elucidate what I now advance. A person of the name of Rûde, at that time an apothecary at Bautzen, had prepared a *pyrophorus* from rye-bran and alum. Not long after he had made the discovery, there broke out in the next village of Nausnitz a great fire, which did much mischief, and was said to have been occasioned by the treating of a sick cow in the cow-house. Mr. Rûde knew that the countrymen were used to lay an application of parched rye-bran to their cattle, for curing the thick neck; he knew also, that alum, and rye-bran, by a proper process, yielded a *pyrophorus*; and now he wished to try whether parched rye-bran alone would have the same effect. Accordingly he roasted a quantity of rye bran by the fire, till it had acquired the colour of roasted coffee. This roasted bran he wrapped up in a linen cloth; in the space of a few minutes there arose a strong smoke through the cloth, accompanied by a smell of burning. Not long afterwards the rag grew as black as tinder, and the bran, now become hot, fell through it on the ground in little balls. Mr. Rûde repeated the experiment at various times, and always with the same result. Who now will any longer doubt, that the frequency of fires in cow-houses, which, in those parts, are mostly wooden buildings, may not be occasioned by this common practice, of binding roasted bran about the necks of the cattle? The fire, after consuming the cattle and the shed, communicates itself to the adjoining buildings; great damage ensues; and the ignorant look for the cause in wilful and malicious firing, consequently in a capital crime.

“ Montet relates, in the *Mémoires de l'Académie de Paris*, 1748, that animal substances, under certain circumstances, may kindle into flame; and that he himself has been witness to the spontaneous accension of dunghills. The woollen stuff prepared

at Sevennes, which bears the name of Emperor's stuff, has kindled of itself, and burnt to a coal. It is not unusual for this to happen to woollen stuffs, when in hot summers they are laid in a heap, in a room but little aired.

“ In June, 1781, the same thing happened at a wool-comber's in a manufacturing town in Germany, where a heap of wool-combings, piled up in a close warehouse seldom aired, took fire of itself. This wool had been by little and little brought into the warehouse; and, for want of room, piled up very high, and trodden down, that more might be added to it. That this combed wool, to which, as is well known, rape oil mixed with butter is used in the combing, burnt of itself, was sworn by several witnesses. One of them affirmed that, ten years before, a similar fire happened among the flocks of wool at a clothier's, who had put them into a cask, where they were rammed hard, for their easier conveyance. This wool burnt from within outwards, and became quite a coal; it was very certain that neither fire nor light had been used at the packing, consequently the above fires arose from similar causes.

“ In like manner very credible cloth workers have certified, that after they have bought wool that was become wet, and packed it close in their warehouse, this wool has burnt of itself; and very serious consequences might have followed, if it had not been discovered in time.

“ The spontaneous accension of various matters from the vegetable kingdom, as wet hay, corn, and madder, and at times wet meal and malt, are already sufficiently known. Experiments have likewise repeatedly been made with regard to such phænomena; and it will presently appear, that hemp, or flax, and hemp-oil, have frequently given rise to dreadful conflagrations. Montet says: In the year 1757, a sort of sailcloth, called *prelart*, having one side of it smeared with ochre and oil, took fire in the magazine at Brest, where it had probably kindled of itself. It is not at all unlikely that many fires in seaports have arisen from these self-accensions; as it has often happened that, after the strictest enquiry, the real cause of them has not been discovered.

“ About twenty years ago, several fires broke out within a short space of time in a rope-walk, and in some wooden houses, at St. Petersburg; and, in all these instances, not the slightest trace of wilful firing could be found: but there was lying in the rope-walk, where the cables for the navy are made, a great heap of hemp, among which a considerable quantity of oil had been carelessly spilt, and it was therefore declared spoilt; for which reason it had been bought at a low price, and put up together, and was held to be the cause of the fire. The inferior inhabitants of that part of the town had likewise bought of this spoilt hemp, at a cheaper rate than usual, for closing the chinks and caulking the windows of their houses, which are constructed of barks laid one upon the other. At this rope-walk, coils of cable have been found hot, and the people have been obliged to separate them, to prevent farther danger.

“ It was in the spring of the year 1780, that a fire was discovered on board a frigate lying in the road off Cronstadt; which, if it had not been timely extinguished, would have endangered the whole fleet. After the severest scrutiny, no cause of the fire was to be found; and the matter was forced to remain without explanation, but with strong surmises of some wicked incendiary being at the bottom of it. In the month of August, in the same year, a fire broke out at the hemp-magazine at St. Petersburg, by which several hundred thousand poods (about 36lb. English) of hemp and flax were consumed. The walls of the magazine are of brick, the floors of stone, and the rafters and covering of iron; it stands alone on an island in the Neva, on which, as well as on board the ships lying in the Neva, no fire is permitted. In St. Petersburg, in the same year, a fire was discovered in the vaulted shop of a furrier. In these shops,

which are all vaults, neither fire nor candle is allowed, and the doors of them are all of iron. At length the probable cause was found to be, that the furrier, the evening before the fire, had got a roll of new cere-cloth, (much in use here for covering tables, counters, &c. being easily wiped and kept clean,) and had left it in his vault, where it was found almost consumed.

" In the night between the 20th and 21st of April, 1781, a fire was seen on board the frigate Maria, which lay at anchor, with several other ships, in the road off the island of Cronstadt; the fire was however soon extinguished; and, by the severest examination, little or nothing could be extorted concerning the manner in which it had arisen. The garrison was threatened with a scrutiny that should cost them dear; and, while they were in this cruel suspense, the wisdom of the sovereign gave a turn to the affair, which quieted the minds of all, by pointing out the proper method to be pursued by the commissioners of inquiry, in the following order to Count Chernichef: When we perceived, by the report you have delivered in of the examination into the accident that happened on board the frigate Maria, that, in the cabin where the fire broke out, there were found parcels of matting, tied together with packthread, in which the foot of burnt fir-wood had been mixed with oil, for the purpose of painting the ship's bottom, it came into our mind, that, at the fire which happened last year at the hemp-warehouses, the following cause, among others, was assigned, that the fire might have proceeded from the hemp being bound up in greasy mats, or even from such mats having lain near the hemp: therefore, neglect not to guide your farther inquiries by this remark.

" As, upon juridical examination, as well as private inquiry, it was found that, in the ship's cabin, where the smoke appeared, there lay a bundle of matting, containing Russian lamp-black, prepared from fir-foot, moistened with hemp-oil varnish, which was perceived to have sparks of fire in it at the time of the extinction, the Russian admiralty gave orders to make various experiments, in order to see whether a mixture of hemp-oil varnish and the forementioned Russian black, folded up in a mat and bound together, would kindle of itself.

" They shook forty pounds of fir-wood foot into a tub, and poured about thirty-five pounds of hemp-oil varnish upon it; this they let stand for an hour, after which they poured off the oil. The remaining mixture they now wrapped up in a mat, and the bundle was laid close to the cabin where the midshipmen had their birth. To avoid all suspicion of treachery, two officers sealed both the mat and the door with their own seals, and stationed a watch, of four sea-officers, to take notice of all that passed the whole night through; and, as soon as any smoke should appear, immediately to give information to the commandant of the port.

" The experiment was made the 26th of April, about 11 o'clock A. M. in presence of all the officers named in the commission. Early on the following day, about 6 o'clock A. M. a smoke appeared, of which the chief commandant was immediately informed by an officer: he came with all possible speed, and, through a small hole in the door, saw the mat smoking. Without opening the door, he dispatched a messenger to the members of the commission; but, as the smoke became stronger, and fire began to appear, the chief commandant found it necessary, without waiting for the members of the commission, to break the seals and open the door. No sooner was the air thus admitted, than the mat began to burn with greater force, and presently it burst into a flame.

" The Russian admiralty, being now fully convinced of the self-enkindling property of this composition, transmitted their experiment to the Imperial Academy of Sciences; who appointed my friend Mr. Georgi, a very learned and able adjunct of the Academy, to make farther experiments on the subject,

and to him I am chiefly indebted for this account; though, being myself at the time upon a visit to some of my old parishioners at Cronstadt, I made myself acquainted with many of the circumstances on the spot.

" The experiments of this ingenious chemist are of great importance, as they form a valuable addition to our knowledge on the subject, and are very remarkable from the occasion that led to these discoveries.

" Previous to the relation of the experiments, it is necessary to observe, that the Russian fir-black is three or four times more heavy, thick, and unctuous, than that kind of painter's black which the Germans call *kien-rahm*. The former is gathered at Ochta, near St. Petersburg, at Moscow, at Archangel, and other places, in little wooden huts, from resinous fir-wood, and the unctuous bark of birch, by means of an apparatus uncommonly simple, consisting of pots without bottoms set one upon the other; and is sold very cheap. The famous fine German *kien-rahm* is called in Russia *Holland's black*. In what follows, when I speak of raw oil, it is to be understood of linseed-oil or hemp-oil; but most commonly the latter. The varnish is made of five pounds of hemp-oil boiled with two ounces and a half of minium. For wrapping up the composition, Mr. Georgi made use of coarse hemp-linen, and always single, never double. The impregnations and commixtures were made in a large wooden bowl, in which they stood open till they were wrapt up in linen.

" That I may not be too prolix, I will select and communicate only such of the experiments as were most remarkable, and succeeded best.

" Three pounds of Russian fir-black were slowly impregnated with five pounds of hemp-oil varnish; and when the mixture had stood open five hours, it was bound up in linen. By this process it became clotted; but some of the black remained dry. When the bundle had lain sixteen hours in a chest, it was observed to emit a very nauseous, and rather putrid, smell, not quite unlike that of boiling oil. Some parts of it became warm, and steamed much; this steam was watery, and by no means inflammable. Eighteen hours after the mixture was wrapt up, one place became brown, emitted smoke, and directly afterwards glowing fire appeared. The same thing happened in a second and a third place; though other places were scarcely warm. The fire crept slowly around, and gave a thick, grey, stinking smoke. Mr. Georgi took the bundle out of the chest, and laid it on a stone pavement; when, on being exposed to the free air, there arose a slow burring flame, a span high, with a strong body of smoke. Not long afterwards there appeared, here and there, several chaps, or clefts, as from a little volcano, the vapour issuing from which burst into flame. On his breaking the lump, it burst into a very violent flame, full three feet high, which soon grew less, and then went out. The smoking and glowing fire lasted for the space of six hours; and afterwards the remainder continued to glow without smoke for two hours longer. The grey earthy ashes, when cold, weighed five ounces and a half.

" In another experiment perfectly similar to the foregoing, as far as relates to the composition and quantities, the enkindling did not ensue till forty-one hours after the impregnation: the heat kept increasing for three hours, and then the accension followed.

" It is worthy of remark, that these experiments succeeded better on bright days than on such as were rainy; and the accension came on more rapidly.

" In another experiment, three pounds of Russian fir-black were slowly impregnated with three pounds of raw hemp-oil; and the accension ensued after nine hours.

" Three quarters of a pound of German *rahm* were slowly impregnated with a pound and a half of hemp oil varnish. The mixture remained seventy hours before it became hot and reek-

ing. It then gradually became hotter, and emitted a strong exhalation; the effluvia were moist, and not inflammable. The re-action lasted 36 hours, during which the heat was one while stronger, and then weaker, and at length quite ceased.

"Stove or chimney foot, mostly formed from birch wood smoke, was mingled with the above-mentioned substances and tied up; the compound remained cold and quiet.

"Russian fir-black mixed with equal parts of oil of turpentine, and bound up, exhibited not the least re-action or warmth.

"Birch oil mixed with equal parts of Russian fir-black, and bound up, began to grow warm and to emit a volatile smell; but the warmth soon went off again.

"From the experiments of the Admiralty, and of Mr. Georgi, we learn, not only the decisive certainty of the self-accension of foot and oil, when the two substances are mixed under certain circumstances, but also the following particulars:

"Of the various kinds of foot or lamp-black, the experiments succeeded more frequently and surely with the coarser, more unctuous and heavier, like Russian painter's black, than with fine light German *rahm*, or with coarse chimney-foot. In regard to oils, only those experiments succeeded which were made with drying oils either raw or boiled. The proportions of the foot to the oils were, in the successful experiments, very various; the mixture kindled with a tenth, a fifth, a third, with an equal, and likewise with a double proportion of oil. In general, however, much more depends on the mode of mixture, and the manipulation; and, as Mr. Georgi often observed, on the weather: for, in moist weather, the bundles, after becoming warm, would frequently grow cold again.

"It is in all respects remarkable, that it should never till now have been observed, that a mixture which has been made millions of times, in all proportions and quantities, for painting of ships, and the outsides of wooden houses, and sometimes intentionally, sometimes accidentally, left covered or open, a longer or a shorter time, should be capable of kindling of itself. It is highly probable, that, even on this occasion, it was entirely owing to the attention of the Empress that it was made an object of inquiry, or even that it was at all observed.

"Before I finish this paper, I will just mention a self-accension, not noticed till of late, and that by Mr. Hagemann, an apothecary at Bremen. He prepared a boiled oil of *hysscyamus*, or henbane, in the usual way, with common oil. The humidity of the herb was nearly evaporated, when he was called away by other affairs, and was obliged to leave the oil on the fire. The evaporation of the humidity was hereby carried so far, that the herb could easily be rubbed to powder. The oil had lost its green colour, and had become brownish. In this state it was laid on the straining cloth, and placed in the garden, behind the house, in the open air.

"In the space of half an hour, on coming again to this place, he perceived a strong smoke there, though he thought the oil must have long been cooled: on closer inspection, he found that the smoke did not proceed from the oil, but from the herb on the straining-cloth; at the same time the smell betrayed a concealed fire. He stirred the herb about, and blew into it with a bellows, whereupon it broke out into a bright flame. Had this herb been placed in the house, near the fire, it might easily have been supposed that a spark had flown into it, which had caused the inflammation: but this was not the case; the herb had kindled of itself. We see from this, that those who are intrusted with the preparation of boiled oils should take care they do not give occasion to danger by fire, which may excite suspicions of felonious designs, to the ruin of innocent persons in their lives or reputations."

The spontaneous heating and combustion of hay and other vegetable substances are very generally known in this country, as well as the means of preventing such accidents; for which

reason it is not necessary to enlarge on the subject in this place.

INFLATION, formed from *in* and *flatus*; of *fl* "I blow;" blowing up, the act of stretching or filling any flaccid or distensible body with a statulent or windy substance.

INFLECTION, called also a *diffraction*, and *deflection*, in optics, is a property of light, by reason of which, when it comes within a certain distance of any body, it will either be bent from it or towards it; which is a kind of imperfect reflection or refraction. See OPTICS.

INFLECTION, or *Point of INFLECTION*, in the higher geometry, is a point where a curve begins to bend a contrary way.

INFLECTION, in grammar, the variation of nouns and verbs, by declension and conjugation.

INFLUENCE, a quality supposed to flow from the heavenly bodies, either with their light or heat; to which astrologers idly ascribe all sublunary events. Alchemists also, who to this ascribe the philosopher's stone, tell us, that every thing in nature is produced by the influence of the stars, which, in their passage through the atmosphere, imbibe many of its moist parts, the grossest whereof they deposit in the sands and earths where they fall; that these, filtrating through the pores of the earth, descend even to the centre, whence they are driven, by the central fire, back again to the surface; and in their ascent, by a natural kind of sublimation, as they find earths duly disposed, they form natural bodies, as metals, minerals, and vegetables, &c. Thus it is pretended that chemistry, consisting of an artificial imitation of these natural operations, and in applying active principles to passive principles, can form natural bodies, make gold, &c.

INFORMATION, in law, is nearly the same in the crown-office, as what in other courts is called a *declaration*. See PROSECUTION. Informations are of two sorts; first, those which are partly at the suit of the king, and partly at that of a subject; and secondly, such as are only in the name of the king. The former are usually brought upon penal statutes, which inflict a penalty upon conviction of the offender, one part to the use of the king, and another to the use of the informer. By the statute of 31 Eliz. c. 5. no prosecution upon any penal statute, the suit and benefit whereof are limited in part to the king and in part to the prosecutor, can be brought by any common informer after one year is expired since the commission of the offence; nor on behalf of the crown, after the lapse of two years longer; nor, where the forfeiture is originally given only to the king, can such prosecution be had after the expiration of two years from the commission of the offence.

The informations that are exhibited in the name of the king alone, are also of two kinds: first, those which are truly and properly his own suits, and filed *ex officio* by his own immediate officer, the attorney-general: secondly, those in which though the king is the nominal prosecutor, yet it is at the relation of some private person or common informer; and they are filed by the king's coroner and attorney in the court of king's bench, usually called the *master of the crown-office*, who is for this purpose the standing officer of the public. The objects of the king's own prosecutions, filed *ex officio* by his own attorney-general, are properly such enormous misdemeanors as peculiarly tend to disturb or endanger his government, or to molest or affront him in the regular discharge of his royal functions. For offences so high and dangerous, in the punishing or preventing of which a moment's delay would be fatal, the law has given to the crown the power of an immediate prosecution, without waiting for any previous application to any other tribunal: which power, thus necessary, not only to the ease and safety, but even to the very existence, of the executive magistrate, was originally reserved in the great plan of the English

constitution, wherein provision is wisely made for the due preservation of all its parts. The objects of the other species of informations, filed by the master of the crown-office upon the complaint or relation of a private subject, are any gross and notorious misdemeanors, riots, batteries, libels, and other immoralities of an atrocious kind, not peculiarly tending to disturb the government (for those are left to the care of the attorney-general), but which, on account of their magnitude or pernicious example, deserve the most public animadversion. And when an information is filed, either thus, or by the attorney-general *ex officio*, it must be tried by a petit-jury of the county where the offence arises: after which, if the defendant be found guilty, he must resort to the court for his punishment. See Blackstone's Commentaries, vol. iv. p. 309—312.

INFORMER, *informator*, in law, a person that informs against, or prosecutes in any of the king's courts, those that offend against any law or penal statute. See INFORMATION. Informers were very common both in Greece and Rome. Every corner of the streets was pestered with swarms of turbulent rascals, who made it their constant business to pick up stories and catch at every occasion to accuse persons of credit and reputation: these by the Greeks were called *Συνοφάνται*; for a more particular account of whom, see the article SYCOPHANT. Amongst the Romans, informers were of two sorts, *mandatores* and *delatores*. These played into each other's hands; the former marking down such persons as they pretended to have found guilty of any misdemeanor, and the other prosecuting them. What tended to increase the number of these pestilent fellows was, that the informers were entitled to a fourth part of the effects of the persons convicted. Wicked princes rewarded and countenanced this mischievous tribe; but Titus set on foot a most diligent search after them, and punished such as he found with death or banishment. Trajan also is praised by Pliny for a similar conduct.

INFRACTION, formed from *in*, and the supine of *frango* "I break," a rupture or violation of a treaty, law, ordinance, or the like.

INFRA LAPsARII, the name of a sect of predeterminarians, who maintain, that God has created a certain number of men only to be damned, without allowing them the means necessary to save themselves, if they would; and they are thus called, because they hold that God's decrees were formed *infra lapsum*, after his knowledge of the fall, and in consequence thereof; in contradistinction to the SUPRALAPSARIANS.

INFRA-SCAPULARIS, in anatomy. See ANATOMY, *Table of the Muscles*.

INFRA-Spinatus, in anatomy. See ANATOMY, *ibid*.

INFULA, in antiquity, was a mitre worn by the Roman and Grecian priests, upon the head, from which on each side hung a ribband. The covering the head with a mitre was rather a Roman than a Grecian custom, introduced into Italy by Æneas, who covered his head and face at the performance of sacrifice, lest any ill-boding omen should disturb the rites. The infulæ were commonly made of wool, and were not only worn by the priests, but were put upon the horns of the victims, upon the altar and the temple. The infulæ were also called *vittæ*.

INFUNDIBULIFORM, in botany, an appellation given to such monopetalous or one-leaved flowers as resemble a funnel in shape, or which have a narrow tube at one end, and gradually widen towards the limb or mouth.

INFUSION, in pharmacy, an operation whereby the virtues of plants, roots, and the like, are drawn out, by letting them steep in some convenient fluid menstruum, without boiling them therein; since boiling is found to dissipate the finer parts of many bitter and aromatic substances, without more fully extracting their medicinal principles.

INGATESTONE, a town in Essex, with a market on Wednesday. The town consists of one street, the north side of which, and half of the south side, are in the parish of Fryerning. It is 6 miles S. W. of Chelmsford, and 23 N. E. of London. E. lon. 0. 28. N. lat. 51. 39.

INGENUOUS, in a general sense, signifies *open, fair, and candid*. The epithet *ingenuus*, in Roman antiquity, was given to persons born of free parents, who had never been slaves: for the children of the *liberti*, or persons who had obtained their liberty, were called *libertini*, not *ingenui*; this appellation of *ingenuus* being reserved for their children, or the third generation.

INGESTA, is used by some authors to express all sorts of aliment taken into the body.

INGLESHEIM, a town of Germany, in the palatinate of the Rhine, remarkable for having been the residence of the emperors. It is seated on the river Salva, on an eminence, whence there is a charming prospect, five miles S. W. of Mentz, and five W. of Bingen. E. lon. 8. 15. N. lat. 49. 48.

INGLETON, a town in the W. riding of Yorkshire, eight miles N. W. of Settle, and 246 of London.

INGLIS (SIR JAMES), a Scottish poet who flourished towards the middle of the 16th century. According to Mackenzie, he was descended from an ancient family in Fifeshire, where he was born in the reign of James IV. He was educated at St. Andrew's, went to Paris, and returned in the minority of James V. into whose favour he ingratiated himself by his poetry, having written sundry tragedies and comedies, and other poems, that were much applauded by good judges. He joined the French faction against the English; and, in some skirmishes preceding the fatal battle of Pinkie, so distinguished himself that he was knighted on the field. After the loss of that day, he retired into Fife, and amused himself with his favourite studies; and in 1548 published at St. Andrew's his noted Complaint of Scotland. He appears to have read both Greek and Latin authors, and to have been well-skilled in mathematics and philosophy. Unpublished and in MS. (says Mackenzie) are Poems, consisting of Songs, Ballads, Plays, and Farces. He died at Culross in 1554.

INGLUVIES, the crop or craw of granivorous birds, serving for the immediate reception of the food, where it is macerated for some time before it is transmitted to the true stomach.

INGOLSTADT, a handsome town of Germany, in Bavaria, with a famous university, and a fine church. The houses are built of stone, and the streets are large. It is the strongest town in Bavaria, but was taken by the Austrians in 1742. It is seated on the Danube, five miles N. E. of Neuburg, and 45 N. by W. of Munich. E. lon. 11. 10. N. lat. 48. 46.

INGOT, a mass of gold or silver melted down, and cast in a mould, but not coined or wrought.

INGRAFTING, in gardening. See GRAFTING.

INGRATITUDE, the opposite of gratitude. See GRATITUDE. Ingratitude is a crime so shameful, that there never was a man found who would own himself guilty of it; and, though too frequently practised, it is so abhorred by the general voice, that to an ungrateful person is imputed the guilt or the capability of all other crimes. The ungrateful are neither fit to serve their Maker, their country, nor their friends. Ingratitude perverts all the measures of religion and society, by making it dangerous to be charitable and good-natured. A few instances from History may not be improper.

1. In a little work entitled *Friendly Cautions to Officers*, the following atrocious instance of ingratitude is related. An opulent city in the west of England, little used to have troops with them, had a regiment sent to be quartered there: the

principal inhabitants and wealthiest merchants, glad to show their hospitality and attachment to their sovereign, took the first opportunity to get acquainted with the officers, inviting them to their houses, and showing them every civility in their power. This was truly a desirable situation. A merchant, extremely easy in his circumstances, took so prodigious a liking to one officer in particular, that he gave him an apartment in his own house, and made him in a manner absolute master of it, the officer's friends being always welcome to his table. The merchant was a widower, and had only two favourite daughters: the officer in so comfortable a station cast his wanton eyes upon them; and, too fatally succeeding, ruined them both. Dreadful return to the merchant's misplaced friendship! The consequence of this ungenerous action was, that all officers ever after were shunned as a public nuisance, as a pest to society: nor have the inhabitants perhaps yet conquered their aversion to a red-coat.

2. We read in Rapin's History, that during Monmouth's rebellion, in the reign of James II. a certain person knowing the humane disposition of one Mrs. Gaunt, whose life was one continued exercise of beneficence, fled to her house, where he was concealed and maintained for some time. Hearing, however, of the proclamation, which promised an indemnity and reward to those who discovered such as harboured the rebels, he betrayed his benefactress; and such was the spirit of justice and equity which prevailed among the ministers, that he was pardoned and recompensed for his treachery, while she was burnt alive for her charity!

3. The following instance is also to be found in the same History.—Humphrey Bannister and his father were both servants to and raised by the Duke of Buckingham; who being driven to abscond, by an unfortunate accident befalling the army he had raised against the usurper Richard III. he without footman or page retired to Bannister's house near Shrewsbury, as to a place where he had all the reason in the world to expect security. Bannister, however, upon the king's proclamation promising 1000*l.* reward to him that should apprehend the duke, betrayed his master to John Merton high sheriff of Shropshire, who sent him under a strong guard to Salisbury, where the king then was, and there in the market-place the duke was beheaded. But Divine vengeance pursued the traitor Bannister; for, demanding the 1000*l.* that was the price of his master's blood, King Richard refused to pay it him, saying, "He that would be false to so good a master ought not to be encouraged." He was afterwards hanged for manslaughter, his eldest son ran mad and died in a hog-sty, his second became deformed and lame, and his third son was drowned in a small puddle of water. His eldest daughter was got with child by one of his carters, and his second was seized with a leprosy whereof she died.—*Hist. of Eng.* 8vo. vol. i. p. 304.

4. Basilus Macedo the emperor, exercising himself in hunting, a sport he took great delight in, a great stag running furiously against him, fastened one of the branches of his horns in the emperor's girdle, and, pulling him from his horse, dragged him a good distance, to the imminent danger of his life; which a gentleman of his retinue perceiving, drew his sword and cut the emperor's girdle asunder, which disengaged him from the beast, with little or no hurt to his person. But observe what reward he had for his pains. "He was sentenced to lose his head for putting his sword so near the body of the emperor;" and suffered death accordingly. *Zoner. Annal.* tom. 3. p. 155.

INGRESS, in astronomy, signifies the sun's entering the first scruple of one of the four cardinal signs, and especially Aries.

INGRIA, a province of the Russian empire, which now forms the government of St. Petersburg. It is bounded on

the N. by the river Neva and the gulph of Finland, on the E. and S. by the government of Novogorod, and on the W. by that of Livonia. It is about 130 miles long, and 50 broad. The czar Peter the Great wrested it from the Swedes, and it was confirmed to him by the treaty of Nyfladt in 1721. At this time, the inhabitants of the flat country were a Finnish people, but little different from the Fins of Carelia as to their language and manners. They were called Ischorki, and Ischortzi, from the river Ischora, which runs into the Neva. Ingria did not retain its ancient Swedish privileges: on the contrary, Peter made a present of one part of the Ischortzi to certain Russian nobles; who, on their side, were obliged to people the less cultivated cantons of Ingria with colonies of Russians from their estates; and thence it is that we often see a village of Russians surrounded by villages of Fins. These Ischortzi have long followed agriculture. Their economy is an ill-chosen mean between that of the Russians and that of the Fins. They assemble in small villages, of five or ten farms each; and live miserably in small dirty huts. Their household furniture indicates the greatest penury; and their manner of living is squalid and disgusting. Notwithstanding the land that each family occupies is of tolerable extent, their agriculture and cattle are equally poor. Their inclination to idleness and drinking leads them often to sell their stock, and the very corn they have saved for sowing the fields. The money, which that produces, they squander in a short time, and are thus reduced to the most deplorable indigence. In this state they behold their cattle die of hunger and cold with the most perfect indifference. Some of them, however, imitate the Russian villagers, who are better managers, more at their ease, and in better circumstances. The Ingrians are a stupid, suspicious, thievish race, and dangerous from their phlegmatic and pilfering temperament. Those who live along the road to Riga, resemble the gypsies, are vagabonds like them, calculate nativities, and tell fortunes. The dress of the men is exactly like that of the Fin boors; but the habit of the women betrays a vanity, which, considering the poverty of this people, and the tyranny which their husbands and fathers exercise over them, may pass for luxury. The lower part of their dress resembles that of the Fin country women. Their shift reaches down to their knees, has a neck and close wristbands, both of them pinked or wrought. The sleeves are large, and whimsically worked. The body of the shift is large, and puffed with numberless plaits; and the making of it is usually four weeks work. Instead of a petticoat, the Ingrian women tie on each side a linen apron without gathers. These aprons are sometimes of cloth, and sometimes of linen, worked with different colours. Those behind come over one another, but before they are at some distance: the open part of the petticoat then left, is concealed by a smaller apron adorned with glass beads and little shells. Several strings of these beads are worn round the neck, and fall upon the breasts. They carry, rather than wear, heavy ear-rings, with the addition generally of strings of beads. The girls wear their hair loose and uncovered: the married women, on the contrary, conceal their hair, like the Finnish women, with a piece of linen, four yards and a half in length, folded towards the middle into a kind of cap, while its extremities fall upon the back, and are supported by the girdle in such a manner that the whole makes a kind of spread sail over the shoulders. When they dress themselves to go to town, they commonly put on the Russ cap, which is ornamented with a peak in front, lined with fur, and laced round the edges: with this they wear a long gown, made of coarse stuff, and fastened down the breast with buttons. Before the Russians conquered this country, the Ingrians had Lutheran ministers for every canton; but numbers of them have been since converted to the Greek faith. They are full of absurd

notions and Pagan superstitions, which they mix with the ceremonies of Christianity. They commonly consider the figures of the saints as idols to be adored. They carry them into the woods in procession, and there pay them a formal worship. When a man is inclined to marry, he buys himself a girl, and celebrates his nuptials. All the way to the church they are accompanied by two women in veils, who sing compositions, if one may call them so, totally destitute of common sense. No sooner is the marriage ceremony performed, than the husband begins to treat his wife with the utmost severity, and thenceforward keeps her under strict discipline, though not always with the greatest attention to justice. She is often beaten for the faults of the children, and sometimes for those of the domestics. The dead are buried by the priest of the profession to which they belong: but these superstitious people return to the grave, under cover of the night, and, having taken up the sod, deposit eatables for their departed friend, which they renew during a fortnight or three weeks. Dogs and other animals easily scratch up these victuals and devour them, while the simple people that placed them there, believe they were consumed by the deceased. Their general opinion is, that they continue to live in the subterranean world in the same manner as they did on the surface of the earth; and that the grave is little more than a change of habitation: for which reason, they bury their money, that they may have it to use in the other world. They speak to their deceased friends, and go to their tomb for that purpose; but, at the same time, are much afraid of them. Among their holy places there is one on the road from St. Petersburg to Riga. It is formed by a large lime-tree, whose branches are interwoven with those of the forest that are nearest to it, and form a delightful bower. On the festival of St. John, at night, the Ischortzi assemble under this tree, and remain till morning, shrieking, and singing, and dancing, round a great fire; concluding their orgies with burning a white cock, and making the most absurd gesticulations and grimaces.

INGROSSER, or **ENGROSSER**, in common law, is one who buys up corn growing, or any provisions by wholesale, before the market, to sell again. See **FORESTALLING**. It also signifies a clerk who writes records or instruments of law on skins of parchment. See **ENGROSSING**.

INGUEN, in anatomy, the same with what is otherwise called the *groin*.

INGULPHUS, abbot of Croyland, and author of the history of that abbey, was born in London about A. D. 1030. He received the first part of his education at Westminster; and when he visited his father, who belonged to the court of Edward the Confessor, he was so fortunate as to engage the attention of queen Edgitha. That amiable and learned princess took a pleasure in examining our young scholar on his progress in grammar, and in disputing with him in logic; nor did she ever dismiss him without some present as a mark of her approbation. From Westminster he went to Oxford, where he applied to the study of rhetoric, and of the Aristotelian philosophy, in which he made greater proficiency than many of his contemporaries. When he was about 21 years of age, he was introduced to William duke of Normandy (who visited the court of England, A. D. 1051), and made himself so agreeable to that prince, that he appointed him his secretary, and carried him with him into his own dominions. In a little time he became the prime favourite of his prince, and the dispenser of all preferments, humbling some and exalting others, at his pleasure; in which difficult station, he confesseth, he did not behave with a proper degree of modesty and prudence. This excited the envy and hatred of many of the courtiers; to avoid the effects of which, he obtained leave from the duke to go in pilgrimage to the Holy Land, which

was then become fashionable. With a company of 30 horsemen, he joined Sigfrid duke of Mentz, who, with many German nobles, bishops, clergy, and others, was preparing for a pilgrimage to Jerusalem. When they were all united, they formed a company of no fewer than 1000 pilgrims. In their way they spent some time at Constantinople, performing their devotions in the several churches. In their passage through Lycia, they were attacked by a tribe of Arabs, who killed and wounded many of them, and plundered them of a prodigious mass of money. Those who escaped from this disaster at length reached Jerusalem, visited all the holy places, and bedewed the ruins of many churches with their tears, giving money for their reparation. They intended to have bathed in Jordan; but being prevented by the roving Arabs, they embarked on board a Genoese fleet at Joppa, and landed at Brundisium, from whence they travelled through Apulia to Rome. Having gone through a long course of devotions in this city, at the several places distinguished for their sanctity, they separated, and every one made the best of his way into his own country. When Ingulph and his company reached Normandy, they were reduced to 20 half-starved wretches, without money, clothes, or horses: a faithful picture of the foolish disastrous journeys into the Holy Land, so common in those times. Ingulph was now so much disgusted with the world that he resolved to forsake it, and became a monk in the abbey of Fontenelle in Normandy; in which, after some years, he was advanced to the office of prior. When his old master was preparing for his expedition into England, A. D. 1066, he was sent by his abbot, with 100 merks in money, and 12 young men nobly mounted and completely armed, as a present from their abbey. Ingulph having found a favourable opportunity, presented his men and money to his prince, who received him very graciously; some part of the former affection for him reviving in his bosom. In consequence of this he raised him to the government of the rich abbey of Croyland in Lincolnshire, A. D. 1076, in which he spent the last 34 years of his life; governing that society with great prudence, and protecting their possessions from the rapacity of the neighbouring barons by the favour of his royal master. The lovers of English history and antiquities are much indebted to this learned abbot, for his excellent history of the abbey of Croyland, from its foundation, A. D. 664. to A. D. 1091, into which he hath introduced much of the general history of the kingdom, with a variety of curious anecdotes that are nowhere else to be found. Ingulph died of the gout, at his abbey, A. D. 1109, in the 79th year of his age.

INHALER, in medicine, a machine for steaming the lungs with warm water, recommended by Mr. Mudge in the cure of the catarrhus cough. The body of the instrument resembles a porter-pot, holds about a pint, and the handle, which is fixed to the side of it, is hollow. In the lower part of the vessel, where it is soldered to the handle, is a hole, by means of which and three others on the upper part of the handle, the water, when it is poured into the inhaler, will rise to the same level in both. To the middle of the cover a flexible leathern tube about six or seven inches long is fixed, with a mouth-piece of wood or ivory. In the cover there is a valve fixed, which opens and shuts the communication between the upper and internal part of the inhaler and the external air. This valve is extremely simple: being formed only of a short tube descending inwards from the cover, and having beneath a small hole upon which a ball of cork plays. When the mouth is applied to the end of the tube in the act of inspiration, the air rushes into the handle, and up through the body of warm water, and the lungs become, consequently, filled with hot vapour. In expiration, the mouth being still fixed to the tube, the breath, together with the steam on the

surface of the water in the inhaler, is forced up through the valve in the cover. In this manner, therefore, the whole act of respiration is performed through the inhaler, without the necessity, in the act of expiration, of either breathing through the nose, or removing the pipe from the mouth. See the figure in plate 25.

INHERITANCE, a perpetual right or interest in lands invested in a person and his heirs. See **DESCENT**.

INHIBITION, a writ to inhibit or forbid a judge from farther proceeding in a cause depending before him. Sometimes prohibition and inhibition are put together, as of the same import; but inhibition is most commonly a writ issuing out of a higher court-christian to a lower; and prohibition out of the king's court to an inferior court.

INHUMATION, in chemistry, a method of digesting substances, by burying the vessel in which they are contained in horse-dung or earth.

INJECTION, the forcibly throwing a liquid, by means of a syringe or tube, into some canal or sinus, or into a vessel opened by incision. This practice, and that of transfusion, or the conveying the arterial blood of one man, or other animal, into another, were once greatly practised, then laid aside, and lately revived, though to no good purpose, by Dr. Busick Harwood at Cambridge.

Anatomical INJECTION, the filling the vessels of a human or other animal body with some coloured substance, in order to make their figures and ramifications visible.

I. The best account of the method of injecting the sanguiferous vessels of animals, is that by the late Dr. Monro, published in the Medical Essays, vol. i. p. 79.

"The instrument with which the liquor is commonly thrown into the vessels is a tight easy-going syringe of brass, to which several short pipes are fitted, and can be fixed by screws, the other extremities of these pipes being of different diameters without any screw, that they may slide into other pipes, which are so exactly adapted to them at one end, that, when they are pressed a little together, nothing can pass between them: and because their cohesion is not so great as to resist the pushing force of the injection, which would drive off this second pipe, and spoil the whole operation; therefore the extremity of this second sort of pipes, which receives the first kind, is formed on the outside into a square, bounded behind and before by a rising circle, which hinders the key that closely grasps the square part from sliding backwards or forwards; or a bar of brass must stand out from each side of it, to be held with the fingers. The other extremity of each of these second sort of pipes is of different diameter; and near it a circular notch, capable of allowing a thread to be sunk into it, is formed; by this, the thread tying the vessel at which the injection is to be made, will not be allowed to slide off.

"Besides this form described, common to all this second sort of pipes, we ought to have some of the larger ones, with an additional mechanism, for particular purposes; as, for instance, when the larger vessels are injected, the pipe fastened into the vessel ought either to have a valve or a stop-cock, that may be turned at pleasure, to hinder any thing to get out from the vessel by the pipe; otherwise, as the injection, in such a case, takes time to coagulate, the people employed in making the injection must either continue all that while in the same posture; or, if the syringe is too soon taken off, the injected liquor runs out, and the larger vessels are emptied. When the syringe is not large enough to hold at once all the liquor necessary to fill the vessels, there is a necessity of filling it again. If, in order to do this, the syringe was to be taken off from the pipe fixed in the vessel, some of the injection would be lost, and what was exposed to the air would cool and harden; therefore some of the pipes ought to have a reflected curve tube coming out of their side, with a valve so disposed, that no liquor can come from the straight

pipe into the crooked one, but, on the contrary, may be allowed to pass from the crooked to the straight one: the injector then, taking care to keep the extremity of the reflected pipe immersed in the liquor to be injected, may, as soon as he has pushed out the first syringe full, fill it again by only drawing back the sucker; and, repeating this quickly, will be able to throw several syringefuls into the vessels.

"All these different sorts of pipes are commonly made of brass.

"The liquors thrown into the vessels, with a design to fill the small capillary tubes, are either such as will incorporate with water, or such as are oily: both kinds have their advantages and inconveniences; which I shall mention in treating of each, and shall conclude with that which I have found by experience to succeed best.

"All the different kinds of glue, or ichthyocolla, fyths, common glue, &c. dissolved and pretty much diluted, mix easily with the animal-fluids, which is of great advantage, and will pass into very small vessels of a well-chosen and prepared subject, and often answer the intention sufficiently, where the design is only to prepare some very fine membrane, on which no vessels can be expected to be seen so large as the eye can discover whether the transverse sections of the vessels would be circular, or if their sides are collapsed. But when the larger vessels are also to be prepared, there is a manifest disadvantage to the usefulness and beauty of the preparation; for, if nothing but the glutinous liquor is injected, one cannot keep a subject so long as the glue takes of becoming firm; and, therefore, in dissecting the injected part, several vessels will probably be cut and emptied. To prevent this, one may indeed either soak the part well in alcohol, which coagulates the glue; but then it becomes so brittle, that the least handling makes it crack; and if the preparation is to be kept, the larger vessels appear quite shrivelled, when the watery part of the injection is evaporated: or the efflux of the injection may be prevented, by carefully tying every vessel before we are obliged to cut it; still, however, that does not hinder the vessels to contract when the glue is drying. If, to obviate these difficulties, the glutinous liquor should first be injected in such quantity as the capillary vessels will contain, and the common oily or wax injection is pushed in afterwards to keep the larger vessels distended, the wax is very apt to harden before it has run far enough; the two sorts of liquors never miss to mix irregularly, and the whole appears interrupted and broken by their soon separating from each other; which is still more remarkable afterwards, when the watery particles are evaporated.

"Spirit of wine coloured mixes with water and oils, and so far is proper to fill the very small vessels with: but, on the other hand, it coagulates any other liquor it meets, which sometimes blocks up the vessels so much, that no more injection will pass; then it scarce will suspend some of the powders that prove the most durable colours; and as it entirely evaporates, the vessels must become very small; and the small quantity of powder left, having nothing to serve for connecting its particles together, generally is seen so interrupted, that the small ramifications of vessels rather have the appearances of random scratches of a pencil, than of regular continued canals.

"Melted tallow, with a little mixture of oil of turpentine, may sometimes be made to fill very small vessels, and keeps the larger ones at a full stretch; but where any quantity of the animal liquors are still in the vessels, it is liable to stop too soon, and never can be introduced into numbers of vessels which other liquors enter; and it is so brittle, that very little handling makes it crack, and thereby renders the preparation very ugly.

"The method I have always succeeded best with, in making what may be called *subtile* or *fine injections*, is, first to throw in

coloured oil of turpentine, in such a quantity as might fill the very small vessels; and, immediately after, to push the common coarse injection into the larger ones. The oil is subtil enough to enter rather smaller capillary tubes than any colouring can; its resinous parts, which remain after the spirituous are evaporated, give a sufficient adhesion to the particles of the substance with which it is coloured, to keep them from separating, and it intimately incorporates with the coarser injection; by which, if the injection is rightly managed, it is impossible for the sharpest eye to discover that two sorts have been made use of.

“ All the liquors with which the vessels of animals are artificially filled, having very faint, and near the same colours, would not all appear in the very small vessels, because of their becoming entirely diaphanous, without a mixture of some substance to impart its colour to them; and where several sorts of even the largest vessels of any part were filled, one sort could not be distinguished from another, unless the colour of each was different; which has likewise a good effect in making preparations more beautiful. Wherefore anatomists have made use of a variety of such substances, according to their different fancies or intentions; such as gamboge, saffron, ink, burnt ivory, &c. which can be easily procured from painters. My design being only to consider those that are fit to be mixed with the injecting liquors proposed to fill capillary vessels, which is scarce ever to be done in any other, except the branches of the arteries and of some veins, I shall confine myself to the common colours employed to these last named two sorts of vessels, which colours are red, green, and sometimes blue, without mentioning the others, which require very little choice.

“ Anatomists have, I imagine, proposed to imitate the natural colours of the arteries and veins in a living creature, by filling the arteries with a red substance, and the veins with a blue or green: from which, however, there are other advantages, such as the strong reflection which such bodies make of the rays of light, and the unaptness most such bodies have to transmit these same rays, without at least a considerable reflection of the rays peculiar to themselves; or, in other words, their unsuitness to become completely pellucid; without which, the very fine vessels, after being injected, would still be imperceptible. The animal or vegetable substances made use of for colouring injections, such as cochineal, laque, *rad. anchuse*, brazil-wood, indigo, &c. have all one general fault of being liable to run into little knots which stop some of the vessels; their colour fades sooner when kept dry; they more easily yield their tincture when the parts are preserved in a liquor; and rats, mice, and insects, will take them for food: for which reasons, though I have frequently succeeded in injecting them, I rather prefer the mineral kind, such as minium or vermilion for red; of which this last is, in my opinion, the best, because it gives the brightest colour, and is commonly to be bought finely levigated. The green-coloured powder generally used is verdigrease; but I rather choose that preparation of it called *distilled verdigrease*; because its colour is brighter, and it does not so often run into small knots as the common verdigrease, but dissolves in the oily liquors.

“ The method of preparing the injection composed of these materials, is to take for the fine one, a pound of clear oil of turpentine, which is gradually poured on three ounces of vermilion, or distilled verdigrease finely powdered, or rather well levigated by grinding on marble; stir them well with a small wooden spatula till they are exactly mixed, then strain all through a fine linen rag. The separation of the grosser particles is, however, rather better made, by pouring some ounces of the oil upon the powder, and, after stirring them together strongly, stop rubbing with the spatula for a second or so, and pour off into a clean vessel the oil with the vermilion or verdigrease suspended in it; and continue this sort of operation till you observe no more of

the powder come off; and all that remains is granulated. The coarser injection is thus prepared: Take tallow, 1 pound; wax, bleached white, 5 ounces; fallad oil, 3 ounces; melt them in a skillet put over a lamp; then add Venice turpentine, 2 ounces; and as soon as this is dissolved, gradually sprinkle in of vermilion or verdigrease prepared, 3 ounces; then pass all through a clean, dry, warmed linen-cloth, to separate all the grosser particles; and, when you design to make it run far into the vessels, some oil of turpentine may be added immediately before it is used.

“ The next thing to be considered, and indeed what chiefly contributes to the success of injections, is the choice and preparation of the subject whose vessels are to be filled.

“ In choosing a fit subject, take these few general rules: 1. The younger the creature to be injected is, the injection will, *ceteris paribus*, go farthest, and *vice versa*. 2. The more the creature's fluids have been dissolved and exhausted in life, the success of the operation will be greater. 3. The less solid the part designed to be injected is, the more vessels will be filled. 4. The more membranous and transparent parts are, the injection shows better; whereas, in the solid very hard parts of a rigid old creature, that has died with its vessels full of thick strong blood, it is scarce possible to inject great numbers of small vessels.

“ Therefore, in preparing a subject for injecting, the principal things to be aimed at, are: to dissolve the fluids, empty the vessels of them, relax the solids, and prevent the injection's coagulating too soon. To answer all these intentions, authors have proposed to inject tepid or warm water by the arteries, till it returns clear and untinged by the veins; and the vessels are thereby so emptied of blood, that all the parts appear white; after which, they push out the water by forcing in air; and, lastly, by pressing with their hands, they squeeze the air also out. After this preparation, one can indeed inject very subtilly; but generally there are some inconveniences. For in all the parts where there is a remarkable *tunica cellulosa*, it never misses to be full of the water, which is apt to spoil any parts designed to be preserved either wet or dry; and some particles of the water seldom miss to be mixed in the larger as well as smaller vessels with the oily injection, and make it appear discontinued and broken: wherefore it is much better to let this injection of water alone, if it can be possibly avoided, and rather to macerate the body or part to be injected a considerable time in water made so warm as one can hold his hand easily in it; taking care to keep it of an equal warmth all the time, by taking out some of the water as it cools, and pouring in hot water in its place; by which the vessels will be sufficiently softened and relaxed, the blood will be melted down, and the injection can be in no danger of hardening too soon; whereas, if the water is too hot, the vessels shrink, and the blood coagulates. From time to time we squeeze out the liquids as much as possible at the cut vessel by which the injection is to be thrown in. The time this maceration is to be continued, is always in proportion to the age of the subject, the bulk and thickness of what we design to inject, and the quantity of blood we observe in the vessels, which can only be learned by experience; at least, however, care ought to be taken, that the whole subject, or part macerated, is perfectly well warmed all through; and that we continue the pressure with our hands till no more blood can be brought away, whatever position we put the subject in.

When the syringe, injections, and subject, are all in readiness, one of the second sort of pipes is chosen, as near to the diameter of the vessel by which the injection is to be thrown as possible; for, if the pipe is too large, it is almost needless to tell it cannot be introduced. If the pipe is much smaller than the vessel, it is scarce possible to tie them so firmly together,

but, by the wrinkling of the coats of the vessel, some small passage will be left, by which part of the injection will spring back on the injector in the time of the operation, and the nearest vessels remain afterwards undistended, by the loss of the quantity that oozes out. Having chosen a fit pipe, it is introduced at the cut orifice of the vessel, or at an incision made in the side of it; and then a waxed thread being brought round the vessel, as near to its coats as possible, by the help of a needle or a flexible eyed probe, the surgeon's knot is made with the thread, and it is drawn as firmly as the thread can allow; taking care that it shall be sunk into the circular notch of the pipe all round; otherwise it will very easily slide off, and the pipe will be brought out probably in the time of the operation; which ruins it.

"If there have been large vessels cut, which communicate with the vessels you design to inject, or if there are any others proceeding from the same trunk, which you do not resolve to fill, let them be all carefully now tied up, to save the injected liquor, and make the operation succeed better in the view you then have.

"When all this is done, both sorts of injections are to be warmed over a lamp, taking care to stir them constantly, lest the colouring powder fall to the bottom and burn. The oil of turpentine needs be made no warmer than will allow the finger to remain in it, if the subject has been previously well warmed in water: when the maceration has not been made, the oil ought to be scalding hot, that it may warm all the parts which are designed to be injected. The coarse injection ought to be brought near to a boiling. In the mean time, having wrapt several folds of linen round the parts of the syringe which the operator is to gripe, and secured the linen with thread, the syringe is to be made very hot by sucking boiling water several times up, and the pipe within the vessel is to be warmed by applying a sponge dipped in boiling water to it.

"After all is ready, the syringe being cleared of the water, the injector fills it with the finer injection; and then introducing the pipe of the syringe into that in the vessel, he presses them together, and either with one hand holds this last pipe firm, with the other gripes the syringe, and with his breast pushes the sucker; or, giving the pipe in the vessel to be held by an assistant, in any of the ways mentioned in the description of these sorts of pipes, he gripes the syringe with one hand, and pushes the sucker with the other, and consequently throws in the injection; which ought to be done slowly, and with no great force, but proportioned to the length and bulk of the part to be injected and strength of the vessels. The quantity of this fine injection to be thrown in is much to be learned by use. The only rule I could ever fix to myself in this matter was to continue pushing till I was sensible of a stop which would require a considerable force to overcome. But this will not hold where all the branches of any vessel are not injected; as for instance, when the vessels of the thorax only are to be injected: for the aorta bears too great a proportion to the branches sent from it, and therefore less fine injection is requisite here. As soon as that stop is felt, the sucker of the syringe is to be drawn back, that the nearest large vessels may be emptied. Then the syringe is taken off, emptied of the fine injection, and filled with the coarser, which is to be pushed into the vessels quickly and forcibly, having always regard to the strength and firmness of the vessels, bulk, &c. of the part. Continue to thrust the sucker, till a full stop, or a sort of push backwards, is felt, when you must beware of thrusting any more, otherwise some of the vessels will be burst, and the whole or a considerable share of the preparation you designed will be spoiled by the extravasation; but rather immediately stop the pipe by the turn-cock, and take out the syringe to

clean it, and allow sufficient time for the coarse injection to coagulate fully before any part is dissected. Ruysch, immediately after throwing in the injection, put the body into cold water, and stirred it continually for some time, to prevent the vermilion separating from the tallow."

11. The *injection of the lymphatic system* is much more difficult than that of the sanguiferous, on account of the extreme smallness of the vessels; so that till very lately it was almost quite impracticable. Methods indeed had been attempted for this purpose; but, by reason of the improper form of the instruments and the inferior skill of anatomists in former times, we may justly look upon this as one of the most modern improvements in anatomy.

The first thing to be considered, when the lymphatics are to be injected, is a proper method of discovering them; for this is by no means an easy matter, on account of their smallness and transparency.—To find out these vessels the subject must be viewed in a proper place, where the light is neither very strong nor very weak. Mr. Sheldon, who has written a treatise upon this subject, recommends a winter forenoon from ten to two; it being chiefly in the winter season that anatomical preparations are made, and because at that time of the day the light is more clear and steady. He says also, from his own experience, that the light passing through the glass of a window is better for this purpose than the open air, as the vessels are more distinctly seen. The injecting of the vessels is likewise rendered more difficult in the open air, by the ease with which the humidity is evaporated from them. It will likewise be necessary to incline the part in various ways to the light, as some of the vessels are most easily discoverable in one position and some in another. The lacteal trunks under the peritoneal coats of the intestines, and the lymphatics on the external surface of the liver, &c. particularly require this method. He discommends the use of magnifying glasses. "I am persuaded (says he), that those who attempt to find them through this medium, will not acquire that *visus eruditus* which is obtained to a surprising degree by those who have been much experienced in injecting lymphatic vessels. A lateral light is likewise preferable to an horizontal, or even to an oblique sky-light.

"The subjects must be laid upon a table of sufficient height, which might be contrived with a ledge fixed to the table in such a manner as to be water proof; which would be useful for preventing the quicksilver, which is almost always necessary for injecting these vessels, from being lost. The surface of the table should likewise be hollowed, so that the mercury which falls may be collected in the middle, where an hole with a stopper may be made to take out occasionally the quicksilver which collects. Such a table would also be convenient for holding water for the purpose of steeping membranous parts which are frequently to be injected; and which, from being exposed to the air, become dry; which also it is inconvenient and hazardous to move into water during the time of operation. Even a common table with a hole cut in the middle may answer the purpose: the hole may be round or square according to the fancy of the anatomist; but the table must be constructed of such materials as are not liable to warp in warm water. Should the anatomist not be provided with either of these tables, the parts must be laid in a tray or earthen dish, that the quicksilver may be saved."

The materials for injecting these vessels are only quicksilver, and the ceraceous or *coarse* injection of anatomists; the former being always used in injecting the lymphatics and lacteals, it being almost impossible to fill them with another fluid in the dead body. The ceraceous injection is chiefly used for the thoracic duct; and in some particular instances, where the lymphatic trunks have been found larger than the ordinary size, a coarse injection has been made use of. It is made of mutton-suet and yellow resin, in the proportion of two thirds of resin to

one of suet. If required of a thicker consistence, we may add a small quantity of pure wax; if of a softer quality, we may augment the quantity of suet: orpiment, or king's yellow, is generally made use of; though others are equally proper, provided they be fine enough.

The instruments necessary for injecting the lymphatic vessels are the injecting tube and pipes, lancets, blow-pipes, knives, scissars, forceps, needles, and thread. The old injecting tube has been found in a manner entirely useless, the pipe being fixed in a glass tube two or three feet long; which is one of the reasons why, before the time of Hewson, so little of the lymphatic system could be injected. Tubes of such a length are entirely unmanageable by one person, and it is impossible to perform the operation properly with two. To perform it in the best manner, the instrument should be held in the hand like a pencil or pen. The instruments used by our author are tubes made either of glass or of brass; which, when filled with mercury, may be held in the hand like a pen: a glass tube, however, is preferable to the metallic one. It is somewhat in the shape of a trumpet; six inches and a half in length, an inch and a half broad where broadest, and three-eighths of an inch where narrowest. A collar of steel half an inch broad and three quarters of an inch long is cemented to this pipe, and a smaller tube of the same metal is screwed upon the end of the collar; the whole terminating in a capillary tube about an inch in length. This last is the most difficult part of the whole work to execute; it should be drilled out of a solid piece of metal, and not made of a thin bit of plate soldered, as these are apt to turn ragged in the edges, and the solder is also liable to be destroyed by the mercury. Those used by Mr. Sheldon were made by drilling a small hole lengthwise through a bit of well-tempered wire. It is cleaned by means of a very small piece of steel-wire capable of passing through the bore of the tube. This ought to be annealed, lest it should break; in which case the broken bit could not easily be got out. The very small tubes may be made of glass drawn out as fine as we choose; and though very apt to break, they are easily repaired. They ought to be very thin, that they may be easily melted. Sometimes it has been found convenient to fit the collar with a steel stop-cock.

The brass tube represented by our author is about nine inches and an half in length, and half an inch wide where widest. The collar is a full quarter of an inch broad, and three quarters of an inch long; a steel piece and capillary tube being screwed to it as in the other.

The lancets are to be exquisitely sharp, in order to cut into the lymphatic vessels. The latter are easily inflated by the small silver blow-pipes usually put up in the dissecting cases by the London surgical instrument makers: dissecting knives, fine-pointed scissars, accurately made dissecting forceps, with straight or crooked needles, are likewise substituted with advantage, as not being affected by the quicksilver.

The subjects chosen for injection should be as free from fat as possible. In the human subject those who have died universally dropsical, or of an ascites or anasarca, are the best, for the following reasons, viz. in such there is little or no animal oil, and but a very small quantity of red blood; both of which, when they occur in great abundance, very much impede the discovery of the lymphatic vessels; but when the cellular vessels are loaded with water, the absorbents are more readily traced, and with less risk of wounding them in dissection: the preparations also, particularly the dried ones, are more lasting. This circumstance is found to be of most consequence in preparing the absorbent vessels of the trunk and extremities of the human subject. Of all the viscera in young subjects, only the liver and lungs can be injected with success; and these may be successfully injected even in the *fœtus*. It will be most proper to begin the operation upon the subject immediately after death, as lymph or

chyle will then be more readily found in the vessels, than when we wait a longer time. In preparing the lacteals, previously distended with milk in the living subject, it is proper to have the intestines and mesentery plunged (with the ligature upon the root of the latter) into rectified spirit of wine. This process will coagulate the chyle; and the fluid being opaque, the vessels will be beautifully seen when we mean to prepare the parts, by preserving them in proof-spirit as wet specimens: "In this way (says Mr. Sheldon) I have made in the dog one of the most natural preparations that can be seen of the lacteals injected from their orifices by the natural absorption." We may also prepare the lacteals by the method used by Mr. Hunter, already mentioned; by which they will be very conspicuous, by the indigo absorbed from the cavity of the intestines. By tying the thoracic duct near its insertion into the angle formed between the subclavian and jugular veins on the left side, or by tying these veins on both sides, we may distend almost all the absorbents of the animal. Thus we are enabled to pursue these vessels in many parts where they have not yet been discovered, where they can scarcely be traced by injection; and even in some parts where it is utterly impossible for the injections to reach them.

Another method sometimes successfully used by our author, was first practised by Malpighi. In this the part is to be steeped in water, and the liquid changed as long as it appears tinged with blood; suffering the parts afterwards to remain in the same water till the putrefaction begins. As soon as this begins to take place, the air which is extricated will distend the lymphatics, so that they may be easily seen, and then injected with quicksilver. It is, however, remarkable, that this method will not in general answer so well in the human species as in quadrupeds; the air having never passed by putrefaction into the human lacteals in any of the subjects which Mr. Sheldon tried, though it will take place in those of the horse or ass, and many other animals: drawing of the lacteals may likewise be made in this method to very great advantage. In some parts of the human body also, this method may be employed to advantage; as the liver, heart, &c. It may likewise be useful to make ligatures on the large trunks of the vessels previous to the maceration, that thus the air may be confined as soon as it is extricated from the coats by putrefaction. Our author adds, that if ligatures were made upon the wrists and legs *in articulo mortis*, or immediately after death, the lymph would be stopped in the vessels, the latter would become distended, and might be injected with the greatest facility by the common method after taking off the ligature. Mr. Sheldon in such a case recommends the tourniquet. "I have reason (says he) to believe, that absorption goes on as long as muscular irritability remains; which last continues a considerable time after the general life of the animal is lost." On this, however, we cannot forbear to remark, that making ligatures for such purposes upon a human creature *in articulo mortis*, or even immediately after death, savours so much of barbarity, that we cannot think it will be often practised. In some cases, even in the dead subject, ligatures are useful; as when we are searching for the lymphatics in the fingers and toes. In these it is useful to stroke up the parts with the finger, by which means the small quantity of lymph remaining in the vessels will be forced upwards, and stopped by the ligature; after which the vessels may be easily injected with quicksilver, as already mentioned.

To inject the vessels; we must open one or more of them, directing the point of the lancet almost always towards the trunk or trunks of the vessels, and taking care not to carry the incision through the opposite side. If the vessels happen to lie under the peritoneum as the lacteals, or under the pleura as the lymphatics of the lungs, we may cut into their cavity through these membranes. In injecting those of the extremities, however, and in many other parts of the body, it is absolutely necessary to dis-

And the vessels we design to fill away from the fat and reticular substance before we attempt to open them with the lancet. The tube with the pipe affixed to it is previously to be filled with mercury: the anatomist then inflates the vessel by means of the blow-pipe, takes the tube from the assistant, and introduces the small tube into the puncture. In this operation it will be found necessary not to carry the tube farther into the vessel than is sufficient to give the mercury a free passage; for, if we introduce it farther, the passage of the mercury will be impeded by the pipe being pushed against the side of the vessel. Should not the fluid be able to effect a passage, it will then be necessary to press upon the surface of it in the tube with our fingers. If it descend freely, and without any of it passing between the side of the vessel and small pipe, we have only to fill up the tube with mercury as the latter descends; but if it gets out, we must then tie the vessel. This, however, should always be avoided if possible; because, if not very dexterously performed, the operator will be apt to separate the tube from the vessel; and on this account the puncture ought always to be very small, no larger indeed than is necessary to allow the pipe to get in with difficulty. As the injection proceeds, the pressure upon the surface of the quicksilver must be carried on higher and higher in the course of the lymphatic, till we come near the gland or glands into which the vessels terminate; otherwise we shall seldom get the cells of the glands, or the vessels emerging from the opposite side of the glands, well injected. In injecting the lymphatic vessels of the extremities, it will be useful to raise the part where the pipe is inserted higher than the other end of the limb, and to make the assistant press with his hands along the skin in the course of the vessels, which will favour the progress of the injection. When the vessels are sufficiently filled, which may be known by the swelling of them, and by the resistance the mercury meets with, the assistant passes a ligature about the vessel, and ties it above the puncture before the anatomist withdraws the injection-pipe.

The method of injecting the larger trunks or thoracic duct with the coarse injection is exactly similar to that already described for the sanguiferous vessels. Mr. Sheldon, however, recommends the use of some pipes of a particular construction invented by himself. The improvement consists in shaping the ends of the pipes like a pen; taking care to make the edges and point blunt, to avoid cutting the vessel when we introduce them. Thus, much larger tubes than those commonly in use may be admitted; and there is no occasion to make any bulb or rising near the extremity of these small pipes to prevent the thread from slipping off: for this will certainly hinder us from inserting pipes of such diameter as might otherwise be done.

Having thus shown the method of injecting the lymphatics, our author next proceeds to describe the method of dissecting and preparing them either for immediate demonstration, or for preservation for any length of time. In the dissection, great care is requisite, on account of the exquisite thinness of their coats: but if this should happen by accident, it will then be necessary to introduce the pipe at the ruptured part, and, having secured it above and below with ligatures, to fill it again as before directed. Our author recommends, for the purpose of dissection, such knives as are made use of by the Germans and French in tracing the nerves. They must be made thin in the blade like lancets, and not much larger. A variety of different shaped blades, some single and others double-edged, will be necessary for various parts of the body; the fault of the common dissecting knives being that they are too thick in the blade, which makes them soon blunt, and occasions the trouble of perpetual grinding, which is not the case with those just recommended. A sharp-pointed forceps is necessary, in order to lay fast hold of the smallest portion of cellular substance; but they ought not to be so sharp as to endanger the puncturing of the vessels: nor should they by any means be bowed or stiff in the spring, to prevent

the fingers of the operator from being wearied in the operation. They should also be made in such a manner as to hold large as well as small portions of reticular substance. For dissections of this kind, fine pointed scissors and lancets fixed in handles are sometimes necessary; and it is frequently of use to plunge the parts into water, in order to loosen the reticular membrane connected with the outside of the coats of the vessels; by which means they may be dissected more easily, and with less danger of wounding them. The blood may be extracted by frequently changing the water. After being injected with quicksilver, the parts should not be allowed to remain long in the water, because the volatile alkali formed by putrefaction is apt to change the colour of the mercury.

The dissection being performed, the preparation is then to be preserved either in a wet or dry state, according to its nature. Preparations of the larger parts, as the trunk or extremities, should be preserved dry; and to dry them effectually, they should be exposed to a free current of air, but not to the rays of the sun; and the vessels should be displayed in their natural situation. When fully dried, they ought then to be varnished over with transparent spirit or copal varnish; which will not only preserve them from insects, but render them more beautiful, and the vessels more conspicuous. They should then be inclosed in glass cases, where they are to be placed in a horizontal position, and handled as little as possible.

To make preparations of the thoracic duct, we must in the first place fill the aorta, vena cava superior, and vena azygos or intercostalis, with coarse injection; then fill, with the same, the vessels below the right crus or little muscle of the diaphragm. The duct is sometimes prepared with quicksilver; but Mr. Sheldon recommends to anatomists to make drawings of any thing new or remarkable in their preparations of the lymphatic vessels with quicksilver; as most of those specimens, particularly such as are dried, become at last totally useless by reason of the drying of the vessels and the escape or blackening of the mercury; or from the varnish growing more and more opaque with age. The quicksilver injection, however, in some cases is very useful. Thus, for instance, if we wish to demonstrate the valves in the thoracic duct, or any other large absorbent vessel, we need only inject the vessels with quicksilver, dissect and dry them, then cut them open, and let the mercury run out; after which the valves will appear by making sections in the coats of the vessels. This may be done still better by varnishing the vessels three or four times before the sections are made; because the varnish will strengthen the sides of the vessel. In wet preparations the valves in the cavities of these parts may likewise be demonstrated by opening them; or by inverting the vessels, and suspending them in proof malt spirits. Thus the valves that cover the terminations of the thoracic duct on the inside of the angle formed between the jugular and subclavian veins on the left side, and those which terminate the lymphatics on the right side of the neck, arm, and lungs, may be beautifully demonstrated. Specimens of the lacteal vessels, of the absorbents of the heart, lungs, liver, spleen, diaphragm, kidneys, &c. may be kept wet or dry, according to the particular nature of the preparation, or view of the anatomist. Some preparations are the better for being dried and afterwards immersed in vials full of oil of turpentine: by which means the flesh will be rendered transparent, the injection distinctly seen, and the vessels appear extremely beautiful. The only disadvantage of this method is, that the parts on which the vessels pass do not at all preserve their natural bulk, by reason of their shrinking up: and as the wet preparations are free from this inconvenience, Mr. Sheldon does not hesitate at assigning them a decided superiority over the dry ones.—Sometimes it is necessary to fix the preparations upon stiff paper or pasteboard, on account of their weight after being injected with mercury. The paper or pasteboard on

which they are fastened ought to be of various colours, according to the nature of the preparation, in order to form a proper ground for showing the lymphatic vessels. Such small preparations as are preserved in spirits, or oil of turpentine, may be kept in bottles well closed with stoppers; and the larger in common preparation glasses. Our author describes a simple method of stopping the mouths of these preparation glasses, by which means the stopper is rendered nearly as durable as the glass itself. "In order to execute it, let the anatomist take care to have the upper surface of his bottles made plane, by desiring the workmen at the glass-house to flatten them in the making. This they will easily do in forming the round ones, but the flat bottles are attended with considerable difficulty. The right way to make them, I believe, would be to blow them in moulds of various sizes; the workmen should likewise form the bottoms of the bottles perfectly flat, that they may stand upright and steady. Bottles of this form being provided for the larger preparations, we grind the upper surface of them on a flat plate of lead, about a quarter of an inch thick, and two feet in diameter; first with fine emery and water, then with powdered rotten stone, or putty first wet with water, and at last dry; so that the surface may be reduced to an exact horizontal plane, and of as fine a polish as plate-glass. This will soon be done, as the manoeuvre requires but little dexterity; and the anatomist should be provided with a considerable number of these glasses prepared as above directed. To the top of each bottle a piece of plate-glass, cut by a diamond, is to be adapted so as completely to cover, but not project over, the edge of the bottle. When these two smooth surfaces are put upon each other, with a drop of water between, the attraction of cohesion is so considerable, that it requires great force to separate them.

Many preparations of the lymphatics, and other parts preserved in bottles, do not require any strings to suspend them; particularly when fixed on pasteboard or paper: such as require suspension should be tied to strings fixed to the preparation below, and to small holes drilled in the substance of the glass at the bottom of the neck; or to small bits of glass that may be fixed on the inside of the same part. The preparation is thus suspended in limpid proof malt-spirit, the bottle being almost completely filled; the upper and polished surface of the bottle, and the plate of glass, are to be wiped clean and dry; a drop of solution of gum arabic is to be put on the polished surface of the bottle, the top strongly and steadily pressed upon it, so as to bring the two surfaces into as close contact as possible; after which the bottle is to be placed in a cool airy place to dry. A piece of wet ox bladder, freed from fat, and soaked in water till it becomes mucilaginous, is then to be placed over the top, the air pressed out from between it and the glass; after which it must be tied with a pack-thread dipped in the solution of gum arabic. The bladder being cut off neatly under the last turn of the thread, is then to be dried, the string taken cautiously off, and the top and neck painted with a composition of lamp black mixed with japanners gold size: this soon dries, and leaves a fine smooth glossy surface, from which the dirt can at any time be as readily wiped off as from a mirror. By this method large bottles are as easily and effectually secured as small ones; and it is found to answer as well as the hermetical sealing of glasses, which in large vessels is altogether impracticable. If the bottoms have any inequalities which prevent them from standing steady, they may be easily made perfectly flat by grinding them with emery on the plate above mentioned. The tops, if well gummed, will even remain perfectly fixed on the glasses without the bladder: though in the common upright ones it may be advisable to put it on as a defence. Our author informs us, that since his making this discovery he has used glass saucers, with flat tops gummed on. In these vessels

the preparations, by reason of their horizontal posture, appear to great advantage. Thus he has exhibited very early abortions in their membranes, and some other preparations that cannot be suspended or viewed conveniently in the perpendicular direction. Some very delicate preparations, particularly those intended to be viewed with the microscope, those of the ampullæ lacteæ of Liberkuhn, and of the valves of the absorbents, may be preserved either in spirits or dry in tubes closed in the manner just mentioned, and will appear to great advantage. Some of the dry ones may also be advantageously placed in square oblong boxes, made of pieces of plate or white glass neatly gummed together, with narrow slips of white or coloured paper, and the objects may be conveniently viewed in this manner. With respect to the stopper bottles, which are very convenient for holding small preparations, our author advises the stoppers to be perfectly well ground; that they pass rather lower down than the neck of the bottle, for the convenience of drilling two holes obliquely through the inferior edge of the substance of the stopper, opposite to each other, for the convenience of fixing threads to hold the subject; for, if the threads pass between the neck and stopper, a space will be left; or, if the stopper be well ground, the neck of the bottle will be broken in endeavouring to press it down. On the other hand, if any space be left, the thread, by its capillary attraction, will act in such a way as to raise the spirits from the bottle, and cause evaporation, which will likewise take place from the chink between the stopper and neck.

INSTITUTE, a post town of Kilkenny, in the province of Leinster; 63 miles from Dublin. It is also a borough, and returns two members to parliament; patronage in the representative of Sir William Fownes. It has two fairs.

INITIATED, a term properly used in speaking of the religion of the ancient heathens; where it signifies being admitted to the participation of the sacred mysteries. The word comes from the Latin *initiatum*, of *initiare*, *initiare*; which properly signifies to begin sacrificing, or to receive or admit a person to the beginning of the mysteries, or of ceremonies of less importance. The ancients never discovered the deeper mysteries of their religion, nor even permitted some of their temples to be open, to any but those who had been initiated. See **MYSTERY**.

INJUNCTION, in law, a writ generally grounded upon an interlocutory order or decree out of the court of chancery or exchequer, sometimes to give possession to the plaintiff, for want of the defendant's appearance; sometimes to the king's ordinary court, and sometimes to the court-christian, to stop proceedings in a cause, upon suggestion made, that the rigour of the law, if it take place, is against equity and conscience in that case; that the complainant is not able to make his defence in these courts, for want of witnesses, &c. or that they act erroneously, denying him some just advantage. The writ of injunction is directed not only to the party himself, but to all and singular his counsellors, attorneys and solicitors; and if any attorney, after having been served with an injunction, proceeds afterward contrary to it, the court of chancery will commit the attorney to the Fleet for contempt. But if an injunction be granted by the court of chancery in a criminal matter, the court of king's bench may break it, and protect any that proceed in contempt of it.

INJURY, any wrong done to a man's person, reputation, or goods. See **ASSAULT**.

INK, a black liquor used in writing, generally made of an infusion of galls, vitriolated iron, commonly called green vitriol or *copperas*, and gum arabic. The properties which this liquor ought to have, are, 1. To flow freely from the pen, and sink a little into the paper, that the writing be not easily discharged. 2. A very deep black colour, which should be as deep at first as

at any time afterwards. 3. Durability, so that the writing may not be subject to decay by age. 4. Ink should be destitute of any corrosive quality, that it may not destroy the paper, or go through it in such a manner as to render the writing illegible. No kind of ink, however, hath yet appeared which is possessed of all these qualities. The ink used by the ancients was possessed of the second, third, and fourth qualities above mentioned, but wanted the first. Dr. Lewis hath discovered its composition from some passages in ancient authors. "Pliny and Vitruvius (says he) expressly mention the preparation of foot, or what we now call *lamp black*, and the composition of writing-ink from lamp-black and gum. Dioscorides is more particular, setting down the proportions of the two ingredients, viz. three ounces of the foot to one of the gum. It seems the mixture was formed into cakes or rolls; which being dried in the sun, were occasionally tempered with water, as the cakes of Indian ink are among us for painting."

In Mr. Delaval's Treatise on colours, p. 37, he acquaints us, that with an infusion of galls and iron filings he had not only made an exceedingly black and durable ink, but by its means, without the addition of any acid, dyed silk and woollen cloth of a good and lasting black. This kind of ink, however, though the colour is far superior to that of any other, hath the inconvenience of being very easily discharged, either by the smallest quantity of any acid, or even by simple water; because it doth not penetrate the paper in such a manner as is necessary to preserve it from the instantaneous action of the acid or of the water. During the action of the infusion of galls upon the iron in making this kind of ink, a very considerable effervescence takes place, and a quantity of air is discharged, the nature of which hath not yet been examined.

Dr. Lewis has thought the subject of ink-making not unworthy of his attention. From many experiments he infers, that the decay of inks is chiefly owing to a deficiency of galls; that the galls are the most perishable ingredient, the quantity of these, which gives the greatest blackness at first (which is about equal parts with the vitriol), being insufficient to maintain the colour; that, for a durable ink, the quantity of galls cannot be much less than three times that of the vitriol; that it cannot be much greater without lessening the blackness of the ink: that by diminishing the quantity of water, the ink is rendered blacker and more durable; that distilled water, rain water, and hard spring water, have the same effects; that white-wine produces a deeper black colour than water; that the colour produced by vinegar is deeper than that by wine; that proof-spirit extracts only a reddish brown tinge; that the last-mentioned tincture sinks into, and spreads upon, the paper; and hence the impropriety of adding spirit of wine to ink, as is frequently directed, to prevent mouldiness or freezing: that other astringents, as oak bark, bistort, floe-bark, &c. are not so effectual as galls, nor give so good a black, the colour produced by most of these, excepting oak-bark, being greenish: that the juice of flocs does not produce a black colour with martial vitriol; but that, nevertheless, the writing made with it becomes black, and is found to be more durable than common ink: that inks made with saturated solutions of iron in nitrous, marine, or acetous acids, in tartar, or in lemon-juice, were much inferior to the ink made with martial vitriol: that the colour of ink is depraved by adding quicklime, which is done with an intention of destroying any superabundant acid which may be supposed to be the cause of the loss of the colour of ink: that the best method of preventing the effects of this superabundant acid is probably by adding pieces of iron to engage it; and that this conjecture is confirmed by an instance the author had heard, of the great durability of the colour of an ink in which pieces of iron had been long immersed: and lastly, that a decoction of logwood used instead of water, sen-

sibly improves both the beauty and deepness of the black, without disposing it to fade. The same author observes, that the addition of gum-arabic is not only useful, by keeping the colouring matter suspended in the fluid, but also by preventing the ink from spreading, by which means a greater quantity of it is collected on each stroke of the pen. Sugar, which is sometimes added to ink, is found to be much less effectual than gums, and to have the inconvenience of preventing the drying of the ink. The colour of ink is found to be greatly injured by keeping the ink in vessels made of copper or of lead, and probably of any other metal, excepting iron, which the vitriolic acid can dissolve.

The foregoing experiments point out for the best proportions of the ingredients for ink, One part of green vitriol, one part of powdered logwood, and three parts of powdered galls. The best menstruum appears to be vinegar or white wine, though for common use water is sufficient. If the ink be required to be of a full colour, a quart, or at most three pints, of liquor may be allowed to three ounces of galls, and to one ounce of each of the other two ingredients. Half an ounce of gum may be added to each pint of the liquor. The ingredients may be all put together at once in a convenient vessel, and well shaken four or five times each day. In 10 or 12 days the ink will be fit for use, though it will improve by remaining longer on the ingredients. Or it may be made more expeditiously by adding the gum and vitriol to a decoction of galls and logwood in the menstruum. To the ink, after it has been separated from the feculencies, some coarse powder of galls, from which the fine dust has been sifted, together with one or two pieces of iron, may be added, by which its durability will be secured.

This receipt differs in some respects from the following, which is recommended by Dr. Black in his lectures:

Take powdered galls, three ounces; logwood shavings and vitriolated iron, of each one ounce; water from two to three pints, according to the degree of strength required for the ink. Before the boiling is finished, throw in half an ounce of gum-arabic, and when it is dissolved strain the liquor. As a means of preserving the ink from mould, Dr. Black directs about a quarter of an ounce of spirit of wine to be added; and likewise a little powdered cloves ground in a mortar with a little of the ink.

Some attempts were made by Dr. Lewis to endow writing-ink with the great durability of that of the ancients, as well as the properties which it has at present. For this purpose, he first tried animal glues, and then oily matters. A pencil, however, dipped in water washed the former away entirely. Of the latter he says: "As oils are made miscible with watery fluids by the intervention of gum, I mixed some of the softer painters varnish with about half its weight of a thick mucilage of gum arabic, working them well together in a mortar till they united into a smooth uniform mass: this was beaten with lamp-black, and some water added by little and little, the rubbing being continued till the mixture was diluted to a due consistence for writing. It wrote freely, and of a full brownish black colour: the characters could not be discharged by rubbing, but water washed them out, though not near so readily as any of the foregoing. Instead of the painters varnish or boiled oil, I mixed raw linseed oil in the same manner with mucilage and lamp-black, and, on diluting the mixture with water, obtained an ink not greatly different from the other.

"Though these oily mixtures answered better than those with simple gums or glues, it was apprehended that their being dischargeable by water would render them unfit for the purposes intended. The only way of obviating this imperfection appeared to be, by using a paper which should admit the black liquid to sink a little into its substance. Accordingly I took

some of the more sinking kinds of paper, and common paper made damp as for printing; and had the satisfaction to find, that neither the oily nor the simple gummy mixtures spread upon them so much as might have been expected, and that the characters were as fixed as could be desired, for they could not be washed out without rubbing off part of the substance of the paper itself."

"But (continues Dr. Lewis) a further improvement may yet be made, namely, that of uniting the ancient and modern inks together; or using the common vitriolic ink, instead of water, for tempering the ancient mixture of gum and lamp-black. By this method it should seem that the writings would have all the durability of those of former times, with all the advantage that results from the vitriolic ink fixing itself in the paper. Even when the common vitriolic mixture is depended on for the ink, it may in many cases be improved by a small addition of the ancient composition, or of the common Indian ink, which answers the same purpose: when the vitriolic ink is dilute, and flows so pale from the pen, that the fine strokes, on first writing, are scarcely visible, the addition of a little Indian ink is the readiest means of giving it the due blackness. By this admixture it may be presumed also that the vitriolic ink will be made more durable, the Indian ink in some measure covering it, and defending it from the action of the air. In all cases where Indian ink or other similar compositions are employed, cotton should be used in the ink-stand, as already mentioned, to prevent the settling of the black powder."

Since the invention of printing much less attention than formerly has been paid to the making of ink, so that now the art seems to be in a great measure lost. This will appear from a comparison of some ancient manuscripts with the writings of modern times. It being of the utmost importance, however, that public records, wills, and other valuable papers, which cannot admit of being printed, should be written with ink of a durable quality, this inattention seems to have been very culpable, and a restoration of the method of making writing-ink a very valuable acquisition. "The necessity (says Mr. Asple, in his *Origin of Alphabetical Writing*) of paying greater attention to this matter may readily be seen, by comparing the rolls and records that have been written from the 15th century to the end of the 17th, with the specimens we have remaining of various writings from the 5th to the 12th centuries. Notwithstanding the superior antiquity of the latter, they are in excellent preservation; but we frequently find the former, though of more modern date, so much defaced that they are scarcely legible."

This author agrees with Dr. Lewis in the opinion that the ancient inks were composed of foot or ivory black instead of the galls, copperas, and gums, which form the composition of ours. Besides their black inks, however, the ancients used various other colours, as red, gold and silver, purple, &c. Every coloured fluid capable of being used with a pen, may not improperly be deemed an *ink*: of these we have spoken occasionally under the articles *DYEING* and *COLOUR-MAKING*. Green ink was frequently used in Latin manuscripts, especially in the latter ages; and it was frequently employed in signatures by the guardians of the Greek emperors till their wards were of age. Blue or yellow ink was seldom used except in manuscripts; but (says Mr. Asple) "the yellow has not been much in use, as far as we can learn, these 600 years." Some kinds of characters, particularly the metallic, were burnished. Wax was used by the Latins and Greeks as a varnish, but especially by the former, and particularly in the 9th century. It continued a long time in vogue.

A treatise upon inks was published by Peter Caniparius, professor of medicine at Venice; of which an edition was printed at London in 1660. It is divided into six parts. The

first treats of inks made from pyrites, stones, and metals; the second of such as are made from metals and calces; the third from foots and vitriols; the fourth of the different kinds of inks used by the librarii or book-writers, by printers, and engravers; likewise of staining or writing upon marble, stucco, or scagliolia, and of encaustic modes of writing; also of liquids for painting or colouring leather and linen or woollen cloths; restoring inks that had been decayed by time; together with many methods of effacing writing, restoring decayed paper, and different modes of secret writing. The fifth treats of writing inks made in different countries from gums, woods, the juices of plants, &c. as well as of different kinds of varnishes. The sixth treats of the different methods of extracting vitriol, and the chemical uses of it.

Weckerus de Secretis, a treatise printed at Basil in 1612, contains a number of curious particulars concerning ink. He gives also receipts for making gold and silver inks, composed both with these metals and without them; directions for making inks for secret writing, and for defacing them; though in this last part there are many particulars bordering too much on the marvellous.

In the *Philosophical Transactions* for 1787, Dr. Blagden gives some account of a method of restoring decayed inks so as to render them legible. His experiments originated from a conversation with Mr. Asple already quoted, on the question whether the inks made eight or ten centuries ago, and which are found to have preserved their colour very well, were made of the same materials now employed or not? In order to decide the question, Mr. Asple furnished the Doctor with several manuscripts on parchment and vellum from the 9th to the 15th centuries inclusively. Some of these were still very black; others of different shades, from a deep yellowish brown to a very pale yellow, in some parts so faint that it could scarcely be seen. This was tried with simple and phlogisticated alkalies, the mineral acids and infusion of galls. From these experiments it appeared that the ink anciently employed was of the same nature as at present: the letters turned of a reddish or yellowish brown, with alkalies became pale, and were at length obliterated by the dilute mineral acids. The drop of acid liquor, which had been put upon a letter, changed to a deep blue or green on the addition of phlogisticated alkali; with an infusion of galls, in some cases the letters acquired a deep tinge, in others a slight one. "Hence (says the Doctor) it is evident, that one of the ingredients was iron, which there is no reason to doubt was joined with the vitriolic acid; and the colour of the more perfect MSS. which in some was a deep black, and in others a purplish black, together with the restitution of that colour in those which had lost it by the infusion of galls, sufficiently proved that another of the ingredients was astringent matter, which from history appears to have been that of galls. No trace of a black pigment of any sort was discovered; the drop of acid, which had completely extracted a letter, appearing of an uniform pale and ferruginous colour, without an atom of black powder or other extraneous matter floating in it."

As this account differs very materially from the former extracted from Mr. Asple's writings, so the reason given for the continuance of the colour differs no less. This, according to Dr. Blagden, "seems to depend very much on a better preparation of the material upon which the writing was made, namely the parchment or vellum; the blackest letters being generally those which had sunk into it the deepest. Some degree of effervescence was commonly to be perceived when acids were in contact with the surface of these old vellums. I was led, however, to suspect, that the ancient inks contained rather a less proportion of iron than the more modern; for, in general, the tinge of colour produced by the phlogisticated alkali in the acid laid upon

them, seemed less deep: which, however, might depend in part upon the length of time they had been kept; and perhaps more gum was used in them, or they were washed over with some kind of varnish, though not such as gave any gloss."

Among the specimens with which our author was favoured by Mr. Astle, there was one which differed very materially from the rest. It was said to be a manuscript of the 15th century: the letters were of a full engrossing hand, angular without any fine strokes, broad, and very black. None of the chemical solvents above mentioned seemed to produce any effect. Most of them seemed rather to make the letters blacker, probably by cleaning the surface; and the acids, after having been rubbed strongly upon the letters, did not strike any deeper tinge with the phlogisticated alkali. Nothing could obliterate these but what took off part of the vellum; when small rolls of a dirty matter were to be perceived. "It is therefore unquestionable (says the Doctor) that no iron was used in this ink; and, from its resistance to the chemical solvents, as well as a certain clotted appearance in the letters when examined closely, and in some places a slight degree of gloss, I have little doubt that they were formed of a footy or carbonaceous powder and oil, probably something like our present printer's ink; and am not without suspicion that they were actually printed."

On examining this MS. more fully, our author was convinced that it was really a part of a very ancient printed book. In considering the methods of restoring the legibility of decayed writings, our author observes, that perhaps one of the best may be to join phlogisticated alkali with the calx of iron which remains; because the precipitate formed by these two substances greatly exceeds that of the iron alone. On this subject Dr. Blagden disagrees with Mr. Bergman; but to bring the matter to a test, the following experiments were made.

1. The phlogisticated alkali was rubbed in different quantities upon the bare writing. This, in general, produced little effect; though, in a few instances, it gave a blueish tinge to the letters, and increased their intensity; "probably (says the Doctor) where something of an acid nature had contributed to the diminution of their colour." 2. By adding, besides the alkali, a dilute mineral acid to the writing, our author found his expectations fully answered; the letters then changing quickly to a very deep and beautiful blue. It is but of little consequence whether the acid or phlogisticated alkali be first added; though upon farther consideration the Doctor inclined to begin with the alkali. The reason is, that when the alkali is first put on, the colour seems to spread less, and thus not to hurt the legibility of the writing so much as would otherwise be done. His method is to spread the alkali thin over the writing with a feather, then to touch it as gently as possible upon or nearly over the letters with the diluted acid by means of a feather or bit of stick cut to a blunt point. The moment that the acid liquor is applied, the letters turn to a fine blue, beyond comparison stronger than the original trace of the letter; and by applying a bit of blotting paper to suck up the superfluous liquid, we may in a great measure avoid the staining of the parchment: for it is this superfluous liquor which, absorbing part of the colouring matter from the letters, becomes a dye to whatever it touches. Care ought however to be taken not to allow the blotting paper to come in contact with the letters, because the colouring matter may easily be rubbed off while soft and wet. Any one of the three mineral acids will answer the purpose effectually: Dr. Blagden commonly uses the marine. But whichever of the three is used, it ought to be diluted so far as not to be in danger of corroding the parchment; after which the degree of strength seems not to be a matter of great nicety.

Another method of restoring the legibility of old writings is by wetting them with an infusion of galls in white wine; but

this is subject to the same inconvenience with the former, and is besides less efficacious. The Doctor is of opinion that the acid of the galls by itself would be better for the purpose than the infusion of the whole substance of them; and he thinks also that a preferable kind of phlogisticated alkali might be prepared either by purifying the common kind from iron as much as possible, or by making use of the volatile alkali instead of the fixed. Mr. Astle mentions a method of restoring the legibility of decayed writings; but says that it ought not to be hazarded lest a suspicion of deceit should arise.

In the Monthly Review of this volume of the Transactions, we find a method proposed of preventing ink from decaying, which seems very likely to answer the purpose. It consists in washing over the paper to be written upon with the colouring matter of prussian blue, which will not deprave it in colour, or any other respect. By writing upon it with common ink afterwards, a ground of prussian blue is formed under every stroke; and this remains strong after the black has been decayed by the weather, or destroyed by acids. Thus the ink will bear a larger proportion of vitriol at first, and will have the advantage of looking blacker when first written.

Indian Ink, a valuable black for water-colours, brought from China and other parts of the East Indies, sometimes in large rolls, but more commonly in small quadrangular cakes, and generally marked with Chinese characters. Dr. Lewis, from experiments made on this substance, hath shown that it is composed of fine-lamp-black and animal-glue: and accordingly, for the preparation of it, he directs us to mix the lamp-black with as much melted glue as is sufficient to give it a tenacity proper for being made into cakes; and these when dry, he tells us, answered as well as those imported from the East Indies, both with regard to the colour and the freedom of working. Ivory black, and other charcoal blacks, levigated to a great degree of fineness, answered as well as the lamp-black; but in the state in which ivory-black is commonly sold, it proved much too gritty, and separated too hastily from the water.

Printing Ink, a substance totally different from Indian ink, or that made use of in writing. It is an oily composition, of the consistence of a thin ointment. The method of preparing it was long kept a secret by those whose employment it was to make it, and who were interested in concealing it; and even yet is but imperfectly known. The properties of good printing ink are, to work clean and easily, without daubing the types, or tearing the paper; to have a fine black colour; to wash easily off the types; to dry soon; and to preserve its colour without turning brown. This last, which is a most necessary property, is effectually obtained by setting fire to the oil with which the printing ink is made for a few moments, and then extinguishing it by covering the vessel. It is made to wash easily off the types, by using soap as an ingredient; and its working clean depends on its having a proper degree of strength, which is given by a certain addition of rosin. A good deal, however, depends on the proportion of the ingredients to each other; for, if too much soap is added, the ink will work very foul, and daub the types to a great degree. The same thing will happen from using too much black, at the same time that both the soap and black hinder the ink from drying; while too much oil and rosin tear the paper, and hinder it from washing off. By the following receipt printing ink of a tolerable good quality may be made: "Take a Scots pint of linseed oil, and set it over a pretty brisk fire in an iron or copper vessel capable of holding three or four times as much. When it boils strongly, and emits a thick smoke, kindle it with a piece of paper, and immediately take the vessel off the fire. Let the oil burn for about a minute; then extinguish it by covering the vessel: after it has grown pretty cool, add two pounds of black rosin, and one pound of hard soap cut into

hin slices. If the oil is very hot when the soap is added, almost the whole mixture will run over the vessel. The mixture is then to be set again over the fire; and when the ingredients are thoroughly melted, a pound of lamp black, previously put through a lawn sieve, is to be stirred into it. The whole ought then to be ground on a marble stone, or in a mill like the levigating mill."

Though the above receipt is greatly superior to any that hath been hitherto published, all of which are capitally deficient in not mentioning the necessary ingredients of rosin and soap; yet it must be acknowledged, that ink made in this manner is inferior in point of colour, and is likewise more apt to daub the types and make an indistinct impression, than such as is prepared by some of those who make the manufacture of this commodity their employment; so that either a variation in the proportion of the ingredients, a nicety in the mixture, or some additional ingredient, seems necessary to bring it to the requisite perfection.

Ink for the Rolling Press, is made of linseed oil burnt in the same manner as that for common printing ink, and then mixed with Francfort-black, and finely ground. There are no certain proportions which can be determined in this kind of ink; every workman adding oil or black to his ink as he thinks proper, in order to make it suit his purpose. Some, however, mix a portion of common boiled oil which has never been burnt: but this must necessarily be a bad practice, as such oil is apt to go through the paper; a fault very common in prints, especially if the paper is not very thick. No soap is added; because the ink is not cleared off from the copper-plates with alkaline ley as in common printing, but with a brush dipped in oil.

Sympathetic Ink, a liquor with which a person may write, and yet nothing appear on the paper after it is dry, till some other means are used, such as holding the paper to the fire, rubbing it over with some other liquor, &c. These kinds of ink may be divided into seven classes, and that with respect to the means used to make them visible; viz. 1. Such as become visible by passing another liquor over them, or by exposing them to the vapour of that liquor. 2. Those that do not appear so long as they are kept close, but soon become visible on being exposed to the air. 3. Such as appear by strewing or sifting some very fine powder of any colour over them. 4. Those which become visible by being exposed to the fire. 5. Such as become visible by heat, but disappear again by cold or the moisture of the air. 6. Those which become visible by being wetted with water. 7. Such as appear of various colours, red, yellow, blue, &c.

I. The first class contains four kinds of ink, viz. solutions of lead, bismuth, gold, and green vitriol. The first two become visible in the same manner, viz. by the contact of sulphureous liquids or fumes. For the first, a solution of common sugar-of-lead in water will answer as well as more troublesome preparations. If you write with this solution with a clean pen, the writing when dry will be totally invisible; but if it be wetted with a solution of *leper sulphuris*, or of orpiment, dissolved by means of quick-lime; or if it be exposed to the strong vapours of these solutions, but especially to the vapour of volatile tincture of sulphur; the writing will appear of a brown colour, more or less deep according to the strength of the sulphureous fume. By the same means, what is wrote with the solution of bismuth in spirit of nitre will appear of a deep black.

The sympathetic ink prepared from gold depends on the property by which that metal precipitates from its solvent on the addition of a solution of tin. If you write with a solution of gold in aqua regia, and let the paper dry gently in the shade, nothing will appear for the first seven or eight hours. Dip a pencil or a small fine sponge in the solution of tin, and draw it lightly over the invisible characters, they will immediately appear of a purple colour.

Characters wrote with a solution of green vitriol carefully depurated, will likewise be invisible when the paper is dry; but if wetted with an infusion of galls, they will immediately appear as if wrote with common ink. If, instead of this infusion, a solution of the phlogisticated alkali, impregnated with the colouring matter of prussian blue, is made use of, the writing will appear of a very deep blue.

II. To the second class belong the solutions of all those metals which are apt to attract phlogiston from the air, such as lead, bismuth, silver, &c. The sympathetic ink of gold already mentioned belongs also to this class; for, if the characters wrote with it are long exposed to the air, they become by degrees of a deep violet colour, nearly approaching to black. In like manner, characters wrote with a solution of silver in aquafortis are invisible when newly dried, but, being exposed to the sun, appear of a grey colour like slate. To this class also belong solutions of lead in vinegar; copper in aquafortis; tin in aqua regia; emery, and some kinds of pyrites, in spirit of salt; mercury in aquafortis; or iron in vinegar. Each of these has a particular colour when exposed to the air; but they have the disagreeable property of corroding the paper, so that after some time the characters appear like holes cut out of the paper.

III. The third class of sympathetic inks contains such liquids as have some kind of glutinous viscosity, and at the same time are long a-drying; by which means, though the eye cannot discern the characters wrote with them upon paper, the powders strewed upon them immediately adhere, and thus make the writing become visible. Of this kind are urine, milk, the juices of some vegetables, weak solutions of the deliquescent salts, &c.

IV. This class, comprehending all those that become visible by being exposed to the fire, is very extensive, as it contains all those colourless liquids in which the matter dissolved is capable of being reduced, or of reducing the paper, into a sort of charcoal by a small heat. A very easily procured ink of this kind is oil of vitriol diluted with as much water as will prevent it from corroding the paper. Letters wrote with this fluid are perfectly invisible when dry, but instantly appear as black as if wrote with the finest ink, on being held near the fire. Juice of lemons or onions, a solution of sal-ammoniac, green vitriol, &c. will answer the same purpose, though not so easily, or with so little heat.

V. The fifth class comprehends only solutions of regulus of cobalt in spirit of salt; for the properties of which see CHEMISTRY, p. 432.

VI. This class comprehends such inks as become visible when characters wrote with them are wetted with water. They are made of all such substances as deposit a copious sediment when mixed with water, dissolving only imperfectly in that fluid. Of this kind are dried alum, sugar of lead, vitriol, &c. We have therefore only to write with a strong solution of these salts upon paper, and the characters will be invisible when dry; but when we apply water, the small portion of dried salt cannot again be dissolved in the water. Hence the insoluble part becomes visible on the paper, and shows the characters wrote in white, grey, brown, or any other colour which the precipitate assumes.

VII. Characters may be made to appear of a fine crimson, purple, or yellow, by writing on paper with solution of tin in aqua regia, and then passing over it a pencil dipt in a decoction of cochineal, Brazil wood, logwood, yellow wood, &c. Further mention of these may be traced under the articles CHEMISTRY, DYEING, and COLOUR-Making.

Ink-Stones, a kind of small round stones of a white, red, grey, yellow, or black colour, containing a quantity of native martial vitriol, whence they derive the property of making ink, and from thence their name. They are almost entirely

soluble in water, and, besides their other ingredients, contain also a portion of copper and zinc.

INIS-STONE. See MOON-STONE.

INLAND, a name for any part of a country at a distance from the sea.

INLAND Navigation. See CANAL and Inland NAVIGATION.

INLAND Trade, that kind of trade carried on between the different parts of the same kingdom, whether over land, or by means of inland navigation.

INLAYING. See VENEERING, MOSAIC, and MARQUETRY.

INLEALED, in our old writers, signifies entangled or entangled. It is used in the champion's oath.

INLISTING, in a military sense. See LISTING.

INMATES, such persons as are admitted, for their money, to live in the same house or cottage with another man, in different rooms, but going in at the same door; being usually supposed to be poor, and not able to maintain a whole house themselves. These are inquirable in a court-leet. No owner or occupier of a cottage shall suffer any inmates therein, or more families than one to inhabit there, on pain of forfeiting 10s. per month to the lord of the leet.

INN, a river of Germany, which has its source in the country of the Grisons, and at the foot of the mountain Septimerberg. It runs N. E. through Tirol, by Inspruc, and, continuing its course N. E. through Bavaria, passes by Kufstein, Vafseburg, Braunaw, and other towns, and falls into the Danube between Passau and Instadt.

INN, a place appointed for the entertainment and relief of travellers. Inns are licensed and regulated by justices of the peace, who oblige the landlord to enter into recognizances for keeping good order. If a person who keeps a common inn refuses to receive a traveller into his house as a guest, or to find him victuals and lodging on his tendering a reasonable price for them, he is liable to an action of damages, and may be indicted and fined at the king's suit. Judge Blackstone observes, that the rates of all commodities sold by inn-keepers, according to our ancient laws, may be assessed: and inn-keepers not selling their hay, oats, beans, &c. and all manner of victuals, at reasonable prices, without taking any thing for litter, may be fined and imprisoned, &c. by 21 Jac. I. c. 21. Where an inn-keeper harbours thieves, persons of infamous character, or suffers any disorders in his house, or sets up a new inn where there is no need of one, to the hindrance of ancient and well-governed inns, he is indictable and fineable: and by statute, such inn may be suppressed. Action upon the case lies against any inn-keeper, if a theft be committed on his guest by a servant of the inn, or any other person not belonging to the guest; though it is otherwise where the guest is not a traveller, but one of the same town or village, for there the inn-keeper is not chargeable; nor is the master of a private tavern answerable for a robbery committed on his guest: it is said, that even though the travelling guest does not deliver his goods, &c. into the inn-keeper's possession, yet if they are stolen he is chargeable. An inn-keeper is not answerable for any thing out of his inn, but only for such as are within it; yet, where he of his own accord puts the guest's horse to graze, and the horse is stolen, he is answerable, he not having the guest's orders for putting such horse to graze. The inn-keeper may justify the stopping of the horse, or other thing of his guest, for his reckoning, and may retain the same till it be paid. Where a person brings his horse to an inn, and leaves him in the stable, the inn-keeper may detain him till such time as the owner pays for his keeping; and if the horse eats out as much as he is worth, after a reasonable appraisement made, he may sell the horse and pay himself: but when a guest brings several horses to an inn, and afterwards takes them

all away except one, this horse so left may not be sold for payment of the debt for the others; for every horse is to be sold, only to make satisfaction for what is due for his own meat.

INNS, a name by which our colleges of municipal or common law professors and students are called: the old English word for houses of noblemen, bishops, and others of extraordinary note, being of the same signification with the French word *hotel*.

INNS of Court are so called, as some think, because the students there are to serve and attend the courts of judicature; or else, because anciently these colleges received none but the sons of noblemen and better sort of gentlemen, who were here to be qualified to serve the king in his court; as Fortescue affirms. And, in his time, he says, there were about 2000 students in the inns of court and chancery, all of whom were *fili nobilium*, or gentlemen born. But this custom has gradually fallen into disuse; so that in the reign of queen Elizabeth, Sir Edward Coke does not reckon above 1000 students, and the number at present is very considerably less; for which judge Blackstone assigns the following reasons: 1. Because the inns of chancery, being now almost totally filled by the inferior branches of the profession, are neither commodious nor proper for the resort of gentlemen of any rank or figure; so that there are very rarely any young students entered at the inns of chancery. 2. Because in the inns of court all sorts of regimen and academical superintendence, either with regard to morals or studies, are found impracticable, and therefore entirely neglected. Lastly, because persons of birth and fortune, after having finished their usual courses at the universities, have seldom leisure or resolution sufficient to enter upon a new scheme of study at a new place of instruction; wherefore few gentlemen now resort to the inns of court, but such for whom the knowledge of practice is absolutely necessary, or such as are intended for the profession.

Our inns of court, justly famed for the production of men of learning in the law, are governed by masters, principals, benchers, stewards; and other officers; and have public halls for exercises, readings, &c. which the students formerly used to attend and perform for a certain number of years, before they could be admitted to plead at the bar. These societies have not, however, any judicial authority over their members; but instead of this they have certain orders among themselves, which have by consent the force of laws. For lighter offences persons are only excommunicated, or put out of commons; for greater, they lose their chambers, and are expelled the college; and when once expelled out of one society, they are never received by any of the others. The gentlemen in these societies may be divided into benchers, outer-barristers, inner-barristers, and students.

The four principal inns of court, are the Inner Temple and Middle Temple, heretofore the dwelling of the Knights Templars, purchased by some professors of the common law about 300 years ago; Lincoln's Inn, and Gray's Inn, anciently belonging to the earls of Lincoln and Gray. The other inns are the two Serjeants Inns.

INNS of Chancery were probably so called, because anciently inhabited by such clerks as chiefly studied the forming of writs, which regularly belonged to the curators, who are officers of chancery. The first of these was Thavies Inn, begun in the reign of Edward III. and afterwards sold to the society of Lincoln's Inn. Besides this, we have New Inn, Symond's Inn, Clement's Inn, Clifford's Inn, anciently the house of the Lord Clifford; Staple Inn, belonging to the merchants of the staple; Lion's Inn, anciently a common inn with the sign of the lion; Furnival's Inn, and Bernard's Inn. These were heretofore preparatory colleges for younger students; and many were entered here before they were admitted into the inns of court. Now they are mostly taken up by attorneys, solicitors, &c. They all belong

to some of the inns of court, who formerly used to find yearly some of their barristers to read to them.

INNACONDA, a fortress of the Deccan of Hindoostan, in the Guntoor Circa, situate on a hill, 46 miles N. W. by N. of Onagole, and subject to the Nizam of the Deccan.

INNATE IDEAS, those supposed to be stamped on the mind from the first moment of its existence, and which it constantly brings into the world with it: a doctrine which Mr. Locke has taken great pains to refute.

INNERLEITHING, a village of the county of Peebles, in Scotland, on the N. side of the river Tweed; near which is an excellent medicinal spring rising into celebrity.

INNIS. See INCH.

INNISCLOCHRAN, or the SROXBY ISLAND, an island in Lough Ree, in the river Shannon, between the counties of Westmeath and Roscommon, at which place a monastery was founded by St. Marmod about the beginning of the 6th century.

INNISFAIL, derived from *Inis Bheal*, that is, "the island of Bheal," one of the ancient names of Ireland, so denominated from *Bheal*, the principal object of adoration among the ancient inhabitants of the British isles. Innisfail has been erroneously translated the *Island of Destiny*, as *Bheal* was sometimes taken for *Fate* or *Providence*.

INNISFALLEN, an island in the lake of Killarney, in the county of Kerry and province of Munster: in it are the ruins of a very ancient religious house, founded by St. Finian, the patron saint of these parts, and to him the cathedral of Aghadoe is also dedicated. The remains of this abbey are very extensive, its situation romantic and retired. Upon the dissolution of religious houses, the possessions of this abbey were granted to Captain Robert Colham. The island contains about 12 acres, is agreeably wooded, and has a number of fruit-trees. St. Finian flourished about the middle of the 6th century; he was surnamed in Irish *Iobbar*; his father's name was *Conail* the son of *Eschod*; descended from *Kian* the son of *Alild*, king of Munster. There was formerly a chronicle kept in this abbey, which is frequently cited by Sir J. Ware and other antiquaries under the title of the *Annals of Innisfallen*. They contain a sketch of universal history, from the creation of the world to the year 430 or thereabouts; but from thence the annalist has amply enough prosecuted the affairs of Ireland down to his own times. He lived to the year 1215. Sir J. Ware had a copy of them, whereof there is an imperfect transcript among the MSS. of the library of Trinity College, Dublin. They were continued by another hand to the year 1320. Bishop Nicholson, in his Irish historical library, informs us, that the Duke of Chandos had a complete copy of them down to 1320 in his possession. These annals tell us, that in the year 1180, the abbey, which had at that time all the gold and silver and richest goods of the whole country deposited in it, as the place of greatest security, was plundered by Mildwin son of Daniel O'Donoghoe, as was also the church of Ardferit, and many persons were slain in the very cemetery by the McCartys; but God, as it is said in this chronicle, punished this impiety by the untimely end of some of the authors of it.

INNISHANNON, a town in the county of Cork and province of Munster, 134 miles from Dublin; situated on the river Bandon six miles from Kinsale. Here is a charter-school for above 30 boys. The linen manufacture has been much encouraged by the late Mr. Adderley. The river is navigable to Collier's quay, about half a mile below the place. On the west side of the town is a stone bridge. This place was formerly walled, and of some note, as appears by the foundations of several castles and large buildings discovered in it. The town of Innishannon, together with its ferry, were granted to Philip de Barry by Henry V. by letters patent, anno 1412. It has two fairs.

INNISHIRKAN, an island situated between Cape Clear Island and Baltimore Bay, in the county of Cork and province of Munster. In this island stood the castle of Dunelung, possessed by the O'Driscolls, which was surrendered after the defeat of the Spaniards to Captain Hervey on the 23d Feb. 1652. There was afterwards a regular fortification erected on part of the island, which was garrisoned in Queen Ann's time, but it has been for several years dismantled: about a mile to the south are the remains of an ancient abbey, founded 1460, for Franciscans, by Florence O'Driscoll. This island has very good land, and is vastly preferable to that of Cape Clear islands. To the north-west of Innishirkan island lies Hare island, a large fruitful spot; and near it are four small islands called the *Schimes*: also along the coast, in the following order from east to west, are Catle island, 19 acres; Horse island, containing 100 acres; and west of all these is a small spot called Goat island. All these islands, together with the adjacent coast, produce large crops of fine English barley.

INNISKILLING, a borough, market, fair, and post town of Ireland, in the county of Fermanagh and province of Ulster, lying between three lakes. It is about 24 miles east of Ballyshannon, and 79 north-west of Dublin. It sends two members to parliament; patron Lord Inniskilling, this place giving title of viscount to the family of Cole. Its inhabitants distinguished themselves in several considerable engagements in the wars of Ireland at the Revolution, out of which a regiment of dragoons, bearing the title of the Inniskilleners, was mostly formed. They form the 6th regiment of dragoons in the British army. It has a barrack for three companies of foot.

INNOCENT'S DAY, a festival of the Christian church, observed on December 28th, in memory of the massacre of the innocent children by the command of Herod king of Judæa. See *Jesus Christ*; and the article *Jews*. The Greek church in their kalendar, and the Abythinians of Ethiopia in their offices, commemorate 14,000 infants on this occasion.

INNTHAL, a district of Germany, in the Tirol, watered by the river Inn. Inspruc is the capital.

INNUENDO, of *innuo* "I nod or beckon," is a word frequently used in writs, declarations and pleadings, to ascertain a person or thing which was named, but left doubtful, before: as, he (*innuendo* the plaintiff) did so and so: mention being before made of another person. In common conversation or writing, an innuendo denotes an oblique hint or distant reference, in contradiction to a direct and positive charge.

INO, in fabulous history, a daughter of Cadmus and Harmonia, who nursed Bacchus. She married Athamas king of Thebes, after he had divorced Nephele, by whom he had two children, Phryxus and Helle. Ino became mother of Melicerta and Learchus; and soon conceived an implacable hatred against the children of Nephele, because they were to ascend the throne in preference to her own. Phryxus and Helle were informed of Ino's machinations, and they escaped to Colchis on a golden ram. Juno, jealous of Ino's prosperity, resolved to disturb her peace; and more particularly because she was of the descendants of her greatest enemy, Venus. Tiphone was sent by order of Juno to the house of Athamas; and she filled the whole palace with such fury, that Athamas, taking Ino to be a lioness and her children whelps, pursued her and dashed her son Learchus against a wall. Ino escaped from the fury of her husband; and from a high rock she threw herself into the sea with Melicerta in her arms. The gods pitied her fate; and Neptune made her a sea deity, which was afterwards called Leucothoe. Melicerta became also a sea god, known by the name of Palemon.

INOA, festivals in memory of Ino, celebrated yearly with sports and sacrifices at Corinth. An anniversary sacrifice was also offered to Ino at Megara, where she was first worshipped

under the name of *Leucothoe*.—Another in Laconia, in honour of the same. It was usual at the celebration to throw cakes of flour into a pond, which if they sunk were prefaces of prosperity, but if they swam on the surface of the waters they were inauspicious and very unlucky.

INOCARPUS, in botany; a genus of the monogynia order, belonging to the decandria class of plants. The corolla is funnel-shaped; the calyx bifid; the stamina are placed in a double series; the fruit is a monospermous plum.

INOCULATION, or **BUDDING**, in gardening, is commonly practised upon all sorts of stone-fruit; as nectarines, peaches, apricots, plums, cherries, as also upon oranges and jacinthes: and indeed this is preferable to any sort of grafting for most sorts of fruit. The method of performing it is as follows: You must be provided with a sharp pen-knife with a flat haft, which is to raise the bark of the stock to admit the bud; and some sound bafs-mat, which should be soaked in water, to increase its strength, and render it more pliable: then having taken off the cuttings from the trees you would propagate, you must choose a smooth part of the stock, about five or six inches above the surface of the ground, if designed for dwarfs; but if for standards, they should be budded six feet above ground. Then with your knife make an horizontal cut across the rind of the stock, and from the middle of that cut make a slit downwards, two inches in length, that it may be in the form of a T; but you must be careful not to cut too deep, lest you wound the stock: then having cut off the leaf from the bud, leaving the foot-stalk remaining, you should make a cross cut, about half an inch below the eye, and with your knife slit off the bud, with part of the wood to it: this done, you must with your knife pull off that part of the wood which was taken with the bud, observing whether the eye of the bud be left to it or not; for all those buds which lose their eyes in stripping, are good for nothing: then having gently raised the bark of the stock with the flat haft of your pen-knife clear to the wood, thrust the bud therein, observing to place it smooth between the rind and wood of the stock, cutting off any part of the rind belonging to the bud that may be too long for the slit made in the stock; and so having exactly fitted the bud to the stock, tie them closely round with bafs-mat, beginning at the under part of the slit, and so proceeding to the top, taking care not to bind round the eye of the bud, which should be left open.

When your buds have been inoculated three weeks or a month, those which are fresh and plump you may be sure are joined: and at this time you should loosen the bandage, which if it be not done in time, will injure if not destroy the bud. The March following cut off the stock sloping, about three inches above the bud, and to what is left fasten the shoot which proceeds from the bud: but this must continue no longer than one year; after which the stock must be cut off close above the bud. The time for inoculating is from the middle of June to the middle of August: but the most general rule is, when you observe the buds formed at the extremity of the same year's shoot, which is a sign of their having finished their spring growth. The first sort commonly inoculated is the apricot; and the last the orange-tree, which should never be done till the latter end of August. And in doing this work, you should always make choice of cloudy weather; for if it be done in the middle of the day, when the weather is hot, the shoots will perspire so fast as to leave the buds destitute of moisture.

INOCULATION, in a medical sense, is used for the transplantation of diseases from one subject to another, particularly for the insertion of the small-pox, which, though of ancient use in the Eastern countries, is but a modern practice among us.

As to the origin of the art of inoculating the small-pox, as

well as the time and place in which it was performed, they are equally unknown to all by whom the practice is adopted. Accident probably gave rise to it. Pylarini says, that among the Turks it was not attended to except amongst the meaner sort. Dr. Russel informs us in the *Philosophical Transactions*, vol. lviii. p. 142. that no mention is made of it by any of the ancient Arabian medical writers that are known in Europe; and the physicians who are natives in and about Arabia assert, that nothing is to be found regarding it in any of those of a more modern date. He farther says, that he engaged some of his learned Turkish friends to make inquiry; but they did not discover any thing on this subject of inoculation either in the writings of physicians, historians, or poets. Until the beginning of the 18th century, all the accounts we have of inoculating the small-pox are merely traditional. The silence on this subject, observed amongst writers in the countries where the practice obtained, Dr. Russel supposes, with great probability, to be owing to the physicians there never countenancing or engaging in it. It is also remarkable, that before Pylarini's letter to the Royal Society in 1701, nor yet for several years after, this practice is not noticed by any of the most inquisitive travellers. On this Dr. Russel very justly observes, that customs, the most common in distant countries, are often the least apt to attract the observation of travellers, who, engaged in other pursuits, must be indebted to accident for the knowledge of such things as the natives seldom talk of, upon the belief that they are known to all the world.

The first accounts we have in the learned world concerning inoculation, are from two Italian physicians, *viz.* Pylarini and Timoni, whose letters on the subject may be seen in the *Philosoph. Transf. abr.* vol. v. p. 370, &c. The first is dated A. D. 1701; the next is dated A. D. 1713. Whether our inquiries are extended abroad or confined to our own country, inoculation hath been practised under one mode or other time immemorial; in Great Britain and its adjacent isles we have well authenticated accounts, extending farther backward than any from the continent. Dr. Williams of Haverfordwest, who wrote upon inoculation in 1725, proves, that it had been practised in Wales, though in a form somewhat different, time out of mind. Mr. Wright, a surgeon in the same place, says, that buying the small-pox is both a common practice and of long standing in that neighbourhood. He says, that, in Pembrokehire, there are two large villages near the harbour of Milford, more famous for this custom than any other, *viz.* St. Ishmael's and Marloes. The old inhabitants of these villages say, that it has been a common practice; and that one William Allen of St. Ishmael's, who in 1722 was 90 years of age, declared to some persons of good sense and integrity, that this practice was used all his time; that he well remembered his mother telling him, that it was a common practice all her time, and that she got the small-pox that way; so that at least we go back 160 years or more.

In the Highlands of Scotland, and some of the adjacent isles, Dr. Alexander Monro senior informs us, that the custom through ages past hath been to put their children to bed with those who laboured under a favourable small pox, and to tie worsted threads about their children's wrists, after having drawn them through variolous pustules.

According to the result of Dr. Russel's inquiries, the Arabians assert, that the inoculation of the small pox has been the common custom of their ancestors, and that they have no doubt of its being as ancient as the disease itself. It is remarkable, that buying the small-pox is the name universally applied in all countries to the method of procuring the disease: it is true that there are other terms; but in Wales and Arabia, as well as many other countries, this is the usual appellation. From the sameness of the name, and the little diversity observable in

the manner of performing the operation, it is probable that the practice of inoculation in these countries was originally derived from the same source. From its extensive spread, it is probably of great antiquity too.

In the year 1717, Lady Mary Wortley Montague, wife of the English ambassador at Constantinople, had her son inoculated there at the age of six years; he had but few pustules, and soon recovered. In April 1721, inoculation was successfully tried on seven condemned criminals in London, by permission of his majesty. In 1722, Lady Mary Wortley Montague had a daughter of six years old inoculated in this island; soon after which, the children of the royal family that had not had the small-pox were inoculated with success; then followed some of the nobility, and the practice soon prevailed. And here we date the commencement of inoculation under the direction of art.

From the example of the royal family in England, the practice was adopted in Germany, where the late Dr. Houlston greatly promoted it; also in Hanover and its adjacent countries.

After Mr. Maitland had succeeded with those he had inoculated in and about London, he introduced the practice into Scotland in the year 1726.

Sweden soon followed the example of the British. Russia lately engaged one of our principal promoters and improvers of this art. And now there are not many countries that do not more or less practise it.

The modes of inoculation practised in different countries have been exceedingly various.

Inoculation with the blood of variolous patients has been tried without effect: it is the variolous matter only that produces the variolous disease. This can act on a sensible part only, and the activity of the virus then is such, that the smallest atom, though imperceptible to any of our senses, conveys the disease as well as the largest quantity. Hence the most obvious method is the prick of a needle or of the point of a lancet dipped in the matter of a variolous pustule.

By some less experienced surgeons cotton or thread is used, that is previously rubbed with powdered variolous scabs; this thread is drawn with a needle through the cutis, and sometimes left in. This is the method in some parts of the East Indies. The Indians pass the thread on the outside of the hand, between any of the fingers, or between the fore finger and thumb. The Thessalian women inoculate in the forehead and chin. Some abrade the scarf-skin, and rub in the powdered dry scabs which fall from the pustules of patients with the small-pox.

Many of the Greek women make an oblique puncture with a needle, on the middle of the top of the forehead, on each cheek, the chin, each metacarpus, and each metatarsus; then drop in each a little of the pus just taken warm from a patient, and brought in a servant's bosom. Others in Greece make several little wounds with a needle in one, two, or more places, in the skin, till some drops of blood ensue; then the operator pours a drop of warm pus fresh from a pustule, and mixes it with the blood as it issues out; then the wound is covered by some with a bandage, by others with half a walnut shell placed with its concave side over each orifice.

The Chinese convey a pellet of variolated cotton, with the addition of a little musk, into the nostrils of the patient; they collect dry pustules, and keep them in a porcelain bottle well corked; and when they inoculate, they mix a grain of musk with three or four grains of the dry scales, and roll them in cotton. This method may be called *inodoration*.

About Bengal, in the East Indies, the person who intends to be inoculated, having found a house where there is a good sort of the small pox, goes to the bed of the sick person, if he is old enough; or if a child, to one of his relations, and speaks to him as follows: "I am come to buy the small-pox." The answer is, "Buy, if you please." A sum of money is accord-

ingly given, and one, three, or five pustules, for the number must always be odd, and not exceeding five, extracted whole and full of matter. These are immediately rubbed on the skin of the outside of the hand between the fore-finger and the thumb; and this suffices to produce the disease. The same custom obtains in Algiers, Tunis, Tripoli, and other countries.

Very similar to the custom amongst the people about Bengal, &c. is that in Arabia, where on some fleshy part they make several punctures with a needle imbrued in variolous matter taken from a pustule of a favourable kind. Here they buy the small-pox too, as follows: The child to be inoculated carries a few raisins, dates, sugar-plums, or such like; and showing them to the child from whom the matter is to be taken, asks how many pocks he will give in exchange? The bargain being made, they proceed to the operation; but this buying, though still continued, is not thought necessary to the success of the operation. The Arabs say that any fleshy part is proper; but generally they insert the matter between the fore-finger and thumb on the outside of the hand.

The Georgians insert the matter on the fore-arm. The Armenians introduce the matter on the two thighs. In Wales the practice may be termed *infriction* of the small-pox. There some of the dry pustules are procured by purchase, and are rubbed hard upon the naked arm or leg.

The practice in some places is to prick the skin between some of the fingers by means of two small needles joined to one another; and after having rubbed a little of the matter on the spot, a circle is made by means of several punctures of the bigness of a common pustule, and matter is again rubbed over it. The operation is finished by dressing the wound with lint.

Incisions have been made in the arms and legs; and thread, cotton, or lint, previously dipped in the variolous matter, was lodged in them. The practice of some is to bathe the feet in warm water, and then secure lint dipped in the variolous matter on the instep, or other part of the foot, where the skin is thin. Others apply a small blistering plaster, and when the scarf-skin is elevated and slipped off, the variolous matter is applied to the surface of the true skin, and confined there by a little lint or plaster. Scratching the skin with a pin or needle, and then rubbing the part with lint previously dipped in variolous matter, is the custom in some places.

In the Highlands of Scotland they rub some part of the skin with fresh matter, or dip worsted in variolous matter, and tie it about the children's wrists. But this method is more likely to give the small pox in the natural way, unless the cuticle happens by chance to be broken so as to allow the variolous matter to be absorbed. They observe, that if fresh matter is applied a few days successively, the infection is more certain than by one application.

The objections made by the vulgar to the salutary practice of *inoculation*, are too idle to deserve a serious refutation here. It is, however, the duty of every enlightened person, whether of the medical profession or not, to combat them on every occasion: and to hold it forth to parents as one of the first of their duties to preserve the lives of those to whom they have given existence, by a process so easy in its accomplishment, so safe in its consequences, and so laudable in its example.

Though no disease, after it is formed, baffles the powers of medicine more than the small-pox, yet more may be done before hand to render this disease favourable than in any other we know. The artificial method of producing the small-pox hath almost stripped it of its terrors; in general, hath rendered its aspect mild, its progress uniform, and nearly without hazard to the patient. Mr. Mudge, in his Dissertation on the inoculated small-pox, enumerates the following sources of possible danger from this disease, viz. 1. The patient's constitution, 2. The propensity of the patient to be infected. 3. The man-

ner or mode of the infection being communicated. 4. The constitution of the air at the time of infection. And it is the peculiar advantage of *inoculation*, almost totally to exempt its subjects from the disadvantages attendant on these sources.

1. "Respecting the *habit of body*, or state of the patient's constitution at the time of infection."—Constitutional or habitual diseases, in general, do not interfere with the course of the small-pox; whether in its natural or its artificial progress; such as scorbutic eruptions on the skin, stumous complaints, scabby eruptions, excoriated ears, &c. The variolous poison is therefore a thing *suu generis*, and noways affected by these taints of the juices, or what is usually called a bad habit of body; or at least so inconsiderably as not to deprive such patients of any of the advantages of *inoculation*. But the case is much reversed with respect to some accidental diseases. *E. gr.* If, on the attack of the small-pox, the habit or its attending circumstances tend to inflammation, or, on the contrary, to a putrid acrimony, the eruptive fever in these aggravated states will load the body with variolous matter, or produce pustules of a less favourable kind; in either of these cases (not to enumerate more) the patient may chance to be severely affected. But *inoculated* subjects may be infected when the constitution is in the best condition to combat with the disease; if either of those indispositions be attendant, or any other which usually endangers, they may soon be restrained or removed.

2. "The different degrees of propensity in the patient, at different times, to be infected."—That different quantities of matter are produced in different persons in the process of the disease, we find true in fact; and there is the strongest reason to believe, that, previous to infection, the quantity of the variolous matter, or rather that principle in the constitution which eventually produces it, ebbs and flows, is more or less vigorous at different times in the same subject, under various combinations of circumstances. The instances are not uncommon, where the patient who hath withstood at one time all the ordinary means of infection, nay, who hath industriously, but ineffectually, sought it; yet at another hath had a small-pox so malignant in appearance and effect, that the whole body has been converted into an offensive variolous putrescence. If the degree of propensity to receive infection were always the same, it would be inconceivable that any one could pass unaffected when the small-pox became epidemic. From whatever causes, however, this propensity may arise, it is most reasonable to assert, that the increase or decrease of this principle takes place according as the small-pox is epidemic or not. During the continuance of any contagious epidemic disease, we always find that those constitutions which are most congenial with that character, are peculiarly obnoxious to the correspondent distemper. And we may reasonably conclude, that when the constitution of a person not past the small-pox is most saturated with the variolous principle, he is then more particularly subject to infection. Again, it is not only undoubted that the variolous principle subsists in the constitutions of persons not past the small-pox, but it is more than probable that a part of this principle is produced by the eruptive fever, and the rest of the variolous process. Agreeably to what has been said, we find that, during the epidemic tendency, those who have not passed the disease are more open to contagion than in other constitutions of air, when the small-pox is not epidemic, and is consequently a rare disease. Many who have escaped infection from *inoculation* and other means of contagion, on removal into a situation where the small-pox has been epidemic, have presently after been seized with this disorder. Events of this kind are so common as to have given rise to the ill-grounded opinion, that any change of air is hazardous to those who have not had the small-pox. If at a time when the propensity to be affected is the greatest, there should be a concurrence of those

states of the constitution above noticed, how aggravated will the condition of the patient be!

Respecting the evasion of these inconveniences by *inoculation*, it is to be observed, that, as the propensity to the disease differs at different times in the same subject, it is reasonable to suppose that the disorder is produced by downright violence, when there subsists in the patient but little of that peculiarity of constitution so essential to the production of the disease (and so general when the small-pox is epidemic), or, in other words, when the body is indisposed to be poisoned. This consideration, peculiar to the disease when artificially produced, appears to be the true cause of the small quantity of pocky matter, and that general scarcity of pustules, when compared to the natural small-pox, which has ever accompanied *inoculation*, and is one of the grand advantages of the discovery. Farther, as it is very reasonable to suppose that this propensity is the greatest when there is an epidemic constitution of the air which favours the production of the disease; and if it be as probable that the severity or mildness of the disease depends in a good degree upon the greater or lesser propensity of the subject to be infected; it will certainly be an eligible step not to bring on the disorder by *inoculation* during the continuance of an evidently prevailing tendency to the disease. Prudence in this case directs us to take advantage of the absence of such a prevailing tendency, when all the benefits of *inoculation* may be secured; and not to delay the operation, till such a constitution of air prevails as at once makes the operation necessary, and deprives it of some of its advantages. To conclude, we may add to this consideration, that, by the practice of exposure to cold, the violence of the eruptive fever is so far moderated as to prevent its forming an additional quantity of variolous matter, which, in a violent and unrestrained state, it would do, by assimilating the juices of the constitution into the nature of the variolous poison.

3. "The manner or mode of the infection being communicated."—In the natural small-pox, the disease may be produced by accidental contagion, or an epidemic influence. Dr. Mead says, that the air of this climate never produces the plague, small-pox, or measles; and Dr. Arbuthnot says, that the plague itself may be generated by some quality in the air, without any contagion. Be these opinions as they may, it is evident that contagion is sometimes so languid that it requires the agency of other causes to give it activity, so as to produce the tribe of diseases to which it belongs, and which without this agency would never be brought forth; and though the strongest epidemic tendency may not in Europe create the small-pox without the concurrence of contagious sources, yet there is, by the agency of the former, such an alteration made and propensity brought on the animal juices, as is essentially necessary to continue the existence of the disease. Variolous contagion produces its effects by the actual application of its poison, either externally through the medium of the skin; or internally, to the gullet, stomach and guts in the act of deglutition; or, lastly, to the lungs in the act of respiration. Though there may be a possible admission of the poisonous miasmata into the constitution through the skin, from the principle of absorption; yet the poison very seldom, if ever, exerts its influence upon the habit in this manner: possibly by a local actual application of the gross matter lodged in the clothes, or otherwise conveyed, the distemper may sometimes be produced by a kind of *inoculation*, and then the disorder will probably be favourable. But when the poison, in a more dilute state, only floats in or impregnates the air, it seldom enters the pores of the skin, and poisons by way of absorption; for the degrees of activity, in which this power is exerted, are most probably in proportion to the aids the constitution may stand in need of from it. However, it is more than probable that the ordinary mode of infection is by the lungs, which from their structure

they are well calculated to receive, to entangle, and to retain. When either the lungs or the stomach are first infected by the infectious effluvia, it is most reasonable to believe, that these noble parts, together with the fauces, glottis, wind-pipe, and gullet, will frequently labour under a greater load of pustules than the external surface of the body: for it is observed, that when the patient is infected artificially, the parts to which the poison is applied suffer in a greater degree than the more distant; and that the circumjacent skin, to some extent, is filled with pustules. From this particular application of the morbid matter to the fauces, &c. it is probable that the large discharge of saliva, &c. arises, which characterizes the confluent small-pox in adults; and as children swallow this saliva, it excites a diarrhoea, which in them answers to the spitting in those more aged. When the internal parts are oppressed with pustules, there is no interval between the eruptive and the subsequent symptomatic fever; and the suffering which the patient labours under from a generally inflamed skin, heightened by the diseased condition of the nobler parts, perpetuates the first fever. This informs us, that all is not so well within as otherwise the external appearances might have induced us to believe; but that the nobler parts are rendered unfit for the purposes of life, at least are labouring and lagging behind in the process, so that they have not kept pace with the apparent state of the disease on the surface of the body: this some have supposed to be the true general cause of the secondary fever, under which the patient, if he sinks, dies peripneumonic. These consequences frequently attend the infection received in the natural way; and if, superadded to these, the unhappy situation of those described under the first and second sources of danger attends the patient, the disorder will be proportionably aggravated, and the chance of life lessened.

But here again *inoculation* relieves: for by this mode the virus is applied to the external surface of the body, so that the whole constitution (excepting the part immediately surrounding the wound) being affected uniformly, the process of the disease is regularly carried on; and the nobler parts not being particularly affected by a partial application of the variolous fomes to their surface, have no distress to proclaim by a secondary fever, which therefore is scarcely ever seen in *inoculated* patients.

4. "The constitution of the air at the time of infection."—A powerful source of difficulty and danger in the natural small-pox is, the malignant-influence of the air at some seasons, and particularly if it happens at the time of receiving the infection. If this concurs with one or more of the other sources, how dreadful the devastation! Whether this constitution of the air produces its deleterious effects by heightening the natural malignity of the infecting poison, or acts on the constitution itself so as to render the effects of contagion more peculiarly fatal, the consequence of this state of the air is the same. The general characters of a morbid state of the air are the inflammatory and putrid; and it is uniformly observed, that whenever a person is attacked with a fever under either of these prevailing dispositions, it never fails to impress its character upon the disease.

But here also *inoculation* affords the most benign influence. The judicious practitioner does not expose his patient to the pernicious effects of an air that can stamp its baneful character on the small-pox, but chooses the season best calculated for the safety and welfare of his patient; and hence we rarely see the influence of this evil source attendant on the artificial disease.

Having then, that from the influence of one or more of these four sources of difficulty and danger, and that from their union will result a natural small-pox complicated with horrors not to less to be dreaded than the plague; how inestimable must appear that favour of Providence, by which we are freed from the formidable attendants of this disease; viz. *inoculation*, by which the disorder is rendered mild, and in general less hazardous than a common cold! Nay, nothing can be more decisive of this

than the instances which repeatedly occur, of *thousands* being *inoculated* together in the same town or village without the loss of a *single* life.

From attention to the above sources of ill in the natural small-pox, we perceive with sufficient satisfaction the many instances of relief and security which generally we avail ourselves of by *inoculation*; a part of which we have seen, and a few others follow.

1. As already observed, it saves the lives of most who are its subjects. From a general calculation it appears, that in the hospitals for small-pox and *inoculation*, 72 die out of 400 patients having the distemper in the natural way, and only one out of this number when *inoculated*.
2. It lessens the affliction from both the degree and the number of ill symptoms, even when it proves fatal. It lessens the number of pustules; and, by moderating the virulence of the disease, the marks on the face never occur.
3. It is extremely rare that the secondary fever attends it; a symptom productive of much suffering, if the patient is happy enough to escape with life.
4. It produces the disease under the fewest disadvantages, and favours with foresight to prevent many ills not to be guarded against in the natural small-pox.
5. Instead of communicating other disorders with it, many disorders subsequent to the natural are very rarely observed after the artificial small-pox.
6. It effectually removes all just grounds of fear; a passion very injurious in this disease.
7. Soldiers, sailors, and all who would appear abroad, or in public offices, are freed from every anxiety and hazard attendant on the natural small-pox.
8. Servants, women with children at their breasts, pregnant women, magistrates, physicians, &c. are all freed from the most distressing embarrassment, by conformity to *inoculation*.

INOSULATION, in anatomy; the same with **ANASTOMOSIS**.

INOWSLADISLOW, a strong and considerable town of Poland, capital of Cujavia, with a fort, and a palace where the bishop of Cujavia resides. It is 39 miles N. E. of Gnesna, and 90 W. of Warsaw. E. lon. 18. 50. N lat. 52. 58.

INQUEST, the investigation of a jury on any specific question. The term inquest is most frequently applied to the inquiry of a jury summoned by the coroner in cases of violent death. See **CORONER** and **JURY**.

INQUISITION, in the church of Rome, a tribunal in several Roman Catholic countries, erected by the popes for the examination and punishment of heretics. This court was founded in the 12th century by father Dominic and his followers, who were sent by Pope Innocent III. with orders to excite the Catholic princes and people to extirpate heretics, to search into their number and quality, and to transmit a faithful account thereof to Rome. Hence they were called *inquisitors*; and this gave birth to the formidable tribunal of the Inquisition, which was received in all Italy and the dominions of Spain, except the kingdom of Naples and the Low Countries.

This diabolical tribunal takes cognizance of heresy, Judaism, Mahometanism, sodomy, and polygamy; and the people stand in so much fear of it, that parents deliver up their children, husbands their wives, and masters their servants, to its officers, without daring in the least to murmur. The prisoners are kept for a long time, till they themselves turn their own accusers, and declare the cause of their imprisonment; for they are neither told their crime, nor confronted with witnesses. As soon as they are imprisoned, their friends go into mourning, and speak of them as dead, not daring to solicit their pardon, lest they should be brought in as accomplices. When there is no shadow of proof against the pretended criminal, he is discharged after suffering the most cruel torture, a tedious and dreadful imprisonment, and the loss of the greatest part of his effects. The sentence against the prisoners is pronounced publicly, and with extraor-

dinary solemnity. In Portugal, they erect a theatre capable of holding 3000 persons; in which they place a rich altar, and raise seats on each side in the form of an amphitheatre. There the prisoners are placed; and over-against them is a high chair, whither they are called, one by one, to hear their doom, from one of the inquisitors.

These unhappy people know what they are to suffer by the clothes they wear that day. Those who appear in their own clothes are discharged upon payment of a fine: those who have a *santo benito*, or strait yellow coat without sleeves, charged with St. Andrew's cross, have their lives, but forfeit all their effects; those who have the resemblance of flames, made of red serge, sewed upon their *santo benito*, without any cross, are pardoned, but threatened to be burnt if ever they relapse: but those who, besides these flames, have on their *santo benito* their own picture, surrounded with figures of devils, are condemned to expire in the flames. The inquisitors, who are ecclesiastics, do not pronounce the sentence of death; but form and read an act, in which they say, that the criminal being convicted of such a crime, by his own confession, is with much reluctance delivered to the secular power to be punished according to his demerits: and this writing they give to the seven judges who attend at the right side of the altar, who immediately pass sentence. For the conclusion of this horrid scene, see *Act of Faith*.

INSCRIBED, in geometry. A figure is said to be inscribed in another, when all its angles touch the side or planes of the other figure.

INSCRIPTION, a title or writing affixed to any thing, to give some farther knowledge of it, or to transmit some important truth to posterity. Antiquaries are very curious in examining ancient inscriptions found on stones and other monuments of antiquity. Sanchoniathon, contemporary, as it is said, with Gideon, drew most of the memoirs whereof his history is composed, from inscriptions which he found in temples and on columns, both among the Heathens and the Hebrews.

It appears, indeed, that the ancients engraved upon pillars the principles of sciences, as well as the history of the world. Those mentioned by Herodotus show, that this was the first way of instructing people, and of transmitting histories and sciences to posterity. This is confirmed by Plato in his *Hippias*; wherein he says, that Pisistratus engraved on stone-pillars precepts useful for husbandmen. Pliny assures us, that the first public monuments were made of plates of lead; and that the treaties of confederacy concluded between the Romans and the Jews were written upon plates of brass; that (says he) the Jews might have something to put them in mind of the peace and confederacy concluded with the Romans. The Greeks and Romans were great dealers in inscriptions, and were extremely fond of being mentioned in them; and hence it is that we find so many in those countries of ancient learning, that large volumes have been composed, as the collection of Gruter, &c. Since Gruter's collection, Th. Reinsius has compiled another huge volume of inscriptions. M. Fabretti published another volume at Rome in 1679, wherein he has corrected abundance of errors which had escaped Gruter, Reinsius, and other antiquaries, &c. and added a great number of inscriptions omitted by them.—Since all these, Grævius has published a complete collection of inscriptions, in three volumes folio.

Academy of INSCRIPTIONS. See ACADEMY.

INSCRUTABLE, UNSEARCHABLE, in theology, is usually understood of the secrets of Providence, and the judgments of God, which cannot be found out, or into which human reason cannot penetrate.

INSECTS, INSECTA, in natural history, a smaller sort of animals, commonly supposed to be exsanguinous; and distinguished by certain incisions, cuttings, or indentings in their bo-

dies. The word is originally Latin, formed of *in*, and *sec* "I cut;" the reason of which is, that in some of this tribe, as ants, the body seems to be cut or divided into two; or because the bodies of many, as worms, caterpillars, &c. are composed of different circles, or rings, which are a sort of incisions. See ZOOLOGY and ENTOMOLOGY.

Of the Kinds of INSECTS, and where found. Insects, in general, are known to most people, the systematic distinctions but to few; nor have we any English names for the greatest part of them. The general denominations of beetles, butterflies, moths, flies, bees, wasps, and a few other common names, are all that our language supplies. It would, therefore, be in vain to enumerate the immense variety of genera and species to any person unskilled in the science of entomology; we may, however, give directions under general names, where to find each kind. The class of insects is divided by Linnæus into seven orders. See ZOOLOGY and ENTOMOLOGY.

I. The *Coleoptera* kind. Many of these (as the *scarabeus* or chaffer, *dermestes* or leather-eater, *bister* or mimic beetle, *staphylinus* or rove-beetle, &c.) are found in and under the dung of animals, especially of cows, horses, and sheep. Some (as *lucanus* or stag-beetle, *cerambyx* or capricorn-beetle, *dermestes*, &c.) are found in rotten and half-decayed wood, and under the decayed bark of trees. Others (as *bister*, *silpha* or carrion-beetle, *staphylinus*, &c.) on the carcases of animals that have been dead four or five days; on moist bones that have been gnawed by dogs or other animals; on flowers having a fetid smell; and on several kinds of fungous substances, particularly the rotten and most stinking. Others (as *byrrhus*, *curculio* or weevil, *bruchus* or seed-beetle, &c.) may be found in a morning about the bottoms of perpendicular rocks and sand-banks, and also upon the flowers of trees and herbaceous plants. Many kinds (as *gyrinus* or whirl-beetle, *dytiscus* or water-beetle, &c.) may be caught in rivers, lakes and standing pools, by means of a thread-net, with small meshes, on a round wire-hoop, fixed at the end of a long pole. In the middle of the day, when the sun shines hot, some (as the *coccinella* or lady-fly, *hupressis* or burn-cow, *chrysomela* or golden honey-beetle, *cantbaris* or soft-winged beetle, *elater* or spring-beetle, *necydalis* or clipt-winged-beetle, &c.) are to be seen on plants and flowers, blighted trees and shrubs. Others (as *lampyris* or glow-worm, &c.) frequent moist meadows, and are best discovered at night, by the shining light which they emit. A great variety sit close on the leaves of plants, particularly of the burdock, elecampane, colts-foot, dock, thistle, and the like, (as the *caffida* or tortoise-beetle, &c.); or feed on different kinds of tender herbs (as the *meloe* or blister-beetle). Numbers (as the *tenebrio* or stinking-beetle) may be found in houses, dark cellars, damp pits, caves and subterraneous passages; or on umbelliferous flowers (as the *crabhye*, *plant*, &c.); or on the trunks as well as on the leaves of trees, in timber-yards, and in the holes of decayed wood. Some (as the *leptura* or wood-beetle, *cinclula* or glossy beetle, &c.) inhabit wild commons, the margins of pools, marshes, and rivulets; and are likewise seen creeping on flags, reeds, and all kinds of water-plants. Multitudes (as the *carabus* or ground-beetle) live under stones, moss, rubbish, and wrecks near the shores of lakes and rivers. These are found also in bogs, marshes, moist places, pits, holes of the earth, and on stems of trees; and in an evening they crawl plentifully along path-ways after a shower of rain. Some (as the *forficula* or earwig) may be discovered in the hollow stems of decayed umbelliferous plants, and on many sorts of flowers and fruits.

II. *Hemiptera*. Some of these (as the *blatt* or cockroach) are found about bake-houses, &c.; others (as the *grillus* or camel-cricket, *gryllus* or locust, *fulgura cicada* or flea-loenti, *cimex* or bug, &c.) on grass, and all kinds of field-herbage.

Some (as *naiadæ* or boat fly, *nepa* or water-scorpion, &c.) frequent rivers, lakes, and standing-pools.

III. *Lepidoptera*. In the day, when the sun is warm, butterflies are seen on many sorts of trees, shrubs, plants, and flowers. Moths may be seen in the day-time, sitting on pales, walls, trunks of trees, in shades, out-houses, dry holes, and crevices; on fine evenings, they fly about the places they inhabit in the day-time: some (as the *sphinx* or hawk-moth) are seen flying in the day-time over the flowers of honey-suckles and other plants with tubular flowers. Insects of this species seldom sit to feed, but continue vibrating on the wing, while they thrust the tongue or proboscis into the flowers.

IV. *Neuroptera*. Of these, some (as the *myrmelon*, *hemerobius* or pearl-fly, *raphidia* or camel-fly, &c.) are found in woods, hedges, meadows, sand-banks, walls, pales, fruits, and umbelliferous flowers. Others (as *ibidula* or dragon-fly, *ephemera* or may-fly, *phryganea* or spring-fly, &c.) fly about lakes and rivers in the day.

V. *Hymenoptera*. These, including wasps, bees, &c. frequent hedges, shrubs, flowers, and fruits.

VI. *Diptera*. Flies of various kinds constitute this class; of which some (as *æstrus* or gad-fly, *musca* or fly, *tabanus* or whame) fly about the tops of trees, little hills, horses, cows, sheep, ditches, dunghills, and every offensive object. Others (as *tipula*, *cixys*, *asilus* or wasp-fly, &c.) are found on all sorts of flowers, particularly those of a fetid smell.

VII. *Aptera*, or those without wings, comprehend scorpions, spiders, ciabs, lobsters, &c.

Catching and Preserving Insects. In the following directions we shall relate the methods of killing them the most readily, and with the least pain, as the pursuit of this part of natural history hath been often branded with cruelty; and however reasonably the naturalist may exculpate himself by pleading the propriety of submitting to an evil which leads to useful discoveries, yet for wanton cruelty there never can be a just pretext.

1. The first class, consisting of beetles (*coleoptera*), are hard-winged. Many kinds fly about in the day, others in the evening, some at night only. They may be caught with a gauze net, or a pair of forceps covered with gauze. When they are taken, stick a pin through the middle of one of the hard wings, and pass it through the body. They may be killed instantly, by immersion in hot water, as well as in spirit of wine; then stick them on a piece of cork, and afterwards carefully place their legs in a creeping position, and let them continue exposed to the air until all the moisture is evaporated from their bodies. Beetles may also be preserved in spirit of wine, brandy, or rum, closely corked up.

2. Insects of the second class (*hemiptera*) may be killed in the same manner as beetles, and likewise by means of a drop of the ethereal oil of turpentine applied to the head; or in the manner to be described under the next class for killing moths.

3. The division of butterflies and moths (*lepidoptera*), as well as all flies with membranaceous wings, should be caught with a gauze net, or a pair of gauze forceps: when taken in the forceps, run a pin through the thorax or shoulders, between the fore-wings. After this is done, take the pin by the head, and remove the forceps, and with the other hand pinch the breast of the insect, and it will immediately die: the wings of butterflies should be expanded, and kept so by the pressure of small slips of paper for a day or two. Moths expand their wings when at rest, and they will naturally take that position.

The larger kinds of these insects will not so readily expire by this method, as by sticking them upon the bottom of a cork exactly fitted to the mouth of a bottle, into which a little sulphur had been put, and by gradually heating the bottle, till

an exhalation of the sulphur take place, when the insect instantly dies, without injuring its colour or plumage.

The best method of having the most perfect butterflies is to find out, if possible, the larva or caterpillar of each, by examining the plants, shrubs, or trees, they usually feed upon, or by beating the shrubs and trees with long poles, and thereby shaking the caterpillars into a sheet spread underneath to receive them; to put them into boxes covered with thin canvas, gauze, or cut-gut, and to feed them with the fresh leaves of the tree or herb on which they are found: when they are full grown, they will go into the pupa or chrysalis state, and require then no other care till they come out perfect butterflies, at which time they may be killed, as before directed. Sometimes these insects may be found hanging to walls, pales, and branches of trees, in the chrysalis state.

Moths might likewise be procured more perfect, by collecting the caterpillars, and breeding them in the same manner as butterflies. As the larvæ or caterpillars cannot be preserved dry, nor very well kept in spirit, it would be satisfactory if exact drawings could be made of them while they are alive and perfect. It may be necessary to observe, that in breeding these kinds of insects, some earth should be put into the boxes, as likewise some rotten wood in the corners; because, when the caterpillars change into the pupa or chrysalis state, some go into the earth, and continue under ground for many months before they come out into the moth state; and some cover themselves with a hard shell, made up of small pieces of rotten wood.

4. The fourth class of insects (*neuroptera*) may be killed with spirit of wine, oil of turpentine, or by the fumes of sulphur.

5. Those of the next class (*hymenoptera*) may be killed in the same manner. A pin may be run through one of their wing-shells and body.

6. Insects of the sixth class (*diptera*) may likewise be killed by spirit, or by fumes of sulphur.

7. Those of the last division (*aptera*) are, in general, subjects which may be kept in spirit.

When in search of insects, we should have a box suitable to carry in the pocket, lined with cork at the bottom and top to stick them upon, until they are brought home. If this box be strongly impregnated with camphor, the insects soon become stupified, and are thereby prevented from fluttering and injuring their plumage. Besides a small forceps, the collector should have a large musquito gauze-net, and also a pin-cushion with three or four different sizes of pins to suit the different sizes of insects.

In hot climates insects of every kind, but particularly the larger, are liable to be eaten by ants and other small insects; especially before they are perfectly dry; to avoid this, the piece of cork on which our insects are stuck in order to be dried, should be suspended from the ceiling of a room, by means of a slender string or thread; besmear this thread with bird-lime, or some adhesive substance, to intercept the rapacious vermin of those climes in their passage along the thread.

After our insects are properly dried, they may be placed in the cabinet or boxes where they are to remain: these boxes should be kept dry; and also made to shut very close, to prevent small insects from destroying them; the bottoms of the boxes should be covered with pitch, or green wax, over which paper may be laid; or, which is better, lined with cork, well impregnated with a solution of corrosive sublimate mercury in a saturated solution of crude sal-ammoniac in water, an ounce of which will dissolve 2 scruples of the sublimate.

The finest collections have been ruined by small insects, and it is impossible to have our cabinets too secure. Such insects as are thus attacked may be fumigated with sulphur, in the

manner described for killing moths: if this prove ineffectual, they may be immersed in spirit of wine, without much injuring their fine plumage or colours, and afterwards let them be sprinkled about their bodies and infertions of the wings with the solution above-mentioned. But baking the insects in an oven, in the manner described for Birds (under that article), is the most effectual method of extirpating these enemies: however, the utmost caution is requisite in this process, in regulating the heat of the oven.

All kinds of insects having no wings, may be preserved in spirits, brandy, or rum; except crabs, lobsters, and the like, which may conveniently be preserved dry.

INSECTS giving Root to Plants. Of this we have an account, by Mr. Fourgeroux, in the Memoirs of the Academy of Sciences for 1769. The plants, of which Mr. Fourgeroux gives an account, are perfectly the reverse of the worm-plant of China, described by Mr. Reaumur in the year 1726. For, in that case, a worm fixes its snout into the extremity of the plant, and derives nourishment from it. But the plants, of which an account is here given, derive their nourishment from the animals.

The greatest part of the animal-plants which he has seen, grow, he tells us, on the chrysalis of a species of cicada. The plant growing on these insects has got the generic name of *clavaria*, because its stalks and branches, when it has any, are terminated by tubercles, which give the appearance of little clubs. The root of this plant, in general, covers the body of the insect, and sometimes is even extended over its head. When these productions have for some time been preserved in spirits, the plant and animal may be separated from each other without hurting either. Small grooves, formed by the rings of the animal, may be observed running cross the roots of the plant: but no vestige can be found of the root's having any where penetrated the body of the insect. These plants produce fibres differing in length and number. The fibres are terminated by tubercles, which, before the plant arrives at maturity, are solid; but, after that period, they are found punctured, probably by worms which have suffered a metamorphosis upon escaping from them.

According to Mr. Fourgeroux, plants grow, not only on the chrysalis of the cicada, but upon the cicada itself. He saw one of this kind upon a cicada brought from Cayenne. The plant, in this case, differed from the *clavaria* already mentioned. It was a species of fungus, composed of long, white, silky fibres, covering the body of the insect, and extending from seven to eight lines above and below its belly.

The author has found the *clavaria* growing upon worms. He has found it chiefly upon worms, which, suffering a metamorphosis, become afterwards a small species of may-bug. This chrysalis, he observes, is very different from that of the cicada; and, even in its worm-state, may easily be distinguished from it.

After describing these different species of animal-plants, the author next proceeds to offer his opinion upon this subject. He first considers what had been said by Dr. Watson, in the Philosophical Transactions, concerning the vegetating-fly of the Caribbee islands (See *Vegetable Fly*). Dr. Watson's account of these flies is, that they bury themselves about the month of May, and begin to be metamorphosed in June; and that the little plant which grows upon them resembles a branch of coral, is about three inches in height, and carries small protuberances, where worms are generated, which are again converted into flies. The author imagines, that, in this account, Dr. Watson has been deceived by the worms, which he has already observed will eat into the *clavaria*, and undergo a change in the holes which they have there made. Mr. Fourgeroux is rather inclined to adopt the opinion of Dr.

Hill, founded upon observations made at Martinico. There the cicadæ are very frequent; and, during their chrysalis state, bury themselves among dead leaves, to wait their metamorphosis. Dr. Hill imagines, that the seeds of the *clavaria* are then attached to them, and are afterwards developed, much in the same manner as the fungus *in pede equino* grows upon the hoofs of dead horses.

It may appear astonishing, that the *clavaria* should attach itself so constantly to the nymphæ of the cicadæ in America, as it is not observed to do so in other countries. For this Mr. Fourgeroux attempts to account, from viewing the *clavaria* as a parasite peculiar to this species of insect; from the great number of the nymphæ of cicadæ which abound in America; and from the circumstances of the climate and soil, which may render this phenomenon very common there, although it be not observed in Europe.

INSECTS, Anatomical use of. The insect world affords us numerous uses, and those many of them such as no one would at first thought imagine, and which no other operations or operators could so well effect. In the minutiae of anatomy, where knives cannot be introduced, the maggot or the ant may be employed with great success. Skeletons of fœtuses have been prepared by burying them in an ant-hill, and that in so accurate and perfect a manner, that all who have seen them have admired by what means they could be so nicely finished; and the secret of the great Ruyisch, by which he cleared away the parenchymatous substance from his vascular preparations, was of this kind. After injecting the vessels of any part with wax, all that remained to the completing these preparations, was the taking off the parenchymatous or fleshy matter from between and among them. Other anatomists of his time did this by the knife, or by maceration in water and other liquors; but it appeared a sort of magic to them, that his were always not only much sooner executed, but to a greater nicety and perfection than theirs ever possibly could be. His method was only to put a number of the common flesh-eating maggots to the substance; and these regularly ate away all the flesh, their heads getting into crevices which no instrument could reach, and the whole substance of the injection remained unhurt, as their soft bodies could glide between its nicest parts without injuring them; and the wax, being no food for them, was in no danger of being eroded, even in its smallest pieces. The several sizes of the worms or maggots bred from the eggs of different flies were of great use in the perfecting the preparations; for while the larger sort ate the more fleshy parts, where the vessels are large and but few in number, the middle-sized maggots got into the interstices of the more vascular parts; and the most minute of all, which are usually also the most numerous, kept about the surface, and ate away between and among the capillary vessels.

The maggots produced from flies are not the only animals fit for this kind of business. There are several species of beetles of the smaller kinds, whose eggs hatch into a six-legged worm, which eats as much and as nicely as the fly-maggots. All these may be employed very successfully to the preparations of the parts of animals.

These nice anatomists are not confined to animal substances: they often exert their power also on vegetables. Many of them feed on the leaves and fruits of plants; and some species of these work so nicely, that they eat away all the outer membrane and internal parenchymatous substance of the leaves, so as only to leave the net-like plexus of vessels standing. Yet these being unhurt shew the true figure of the leaf, and are a sort of vegetable skeletons, but very poorly imitated by art in the common way, by long macerations in water; this method usually destroying and washing away many of the smaller vessels, which the tender mouths of these creatures spare. If they

exert their skill often upon leaves in this manner, they do it also sometimes with equal if not greater success upon fruits. As, in the leaves, those which have the tenderest parenchyma and the firmest ribs, succeed best; so also it is in fruits. The leaves of the rufcus or butcher's broom, are often found thus beautifully anatomised; and of all fruits, none succeeds so well as that of the stramonium, or thorn-apple. Wherever this plant grows in any plenty, the fruit towards autumn, while it is yet full of juice, is attacked by a small worm, which eats away all the parenchyma, and leaves every vessel standing in its place; and this not only in the outer coat of the fruit, but in the very inner cells of the seeds. These vessels remain exactly in the shape of the fruit, and, growing white with the air, exhibit the most elegant and beautiful skeletons imaginable, while yet standing on the plant. The animal which effects this, is a hexapode worm produced from the egg of a small beetle; and differs very little from some of those which so elegantly eat away the fleshy parts from the injected anatomical preparations. These are gregarious animals like some species of the smaller caterpillars, and numbers of them are always at work together on the same leaf or fruit, so that the skeleton is soon made. They begin by piercing a number of little holes into the substance of the leaf, and thence burrow under the integument till they meet one another; and this being done all over the leaf, they leave it, and go to work upon another.

INSECTS Blown from the Nose. Of this we are furnished with many accounts in the works of medical authors. The fact is confirmed by Dr. Monro, (*Ed. Med. Com.* ii. 312.) who has received at different times some of these insects from different persons. They were all of the scolopendra kind, though not exactly answering to any description of Linnæus. One of these he received from Mr. Hill, surgeon in Dumfries. It was an inch and a half long; and lived some hours after it was discharged, creeping about slowly on a table. It was then put into ardent spirits, soon after which it died.

Noxious INSECTS; Means of destroying them. Of those substances which have been generally observed to be efficacious in driving away or in destroying insects, mercury, and its various preparations, may be reckoned one of the most generally useful. Sulphur is also useful. Oils of all kinds have been often and deservedly recommended. Tobacco is not less remarkable for its utility. Of the application of these in order,

1. Mercury is known to kill or drive away lice from the human body; and it may probably be of equal efficacy in ridding other animals of their insects. For instance, sheep having a small quantity of mercurial ointment rubbed on their skins, on the sides, between the fore-legs and the body, it may kill or drive away the insect peculiar to them. Sulphur is recommended to be added to the mercurial ointment. Thus not only the insect peculiar to them, but also the scab, may be cured: See the Transactions of the Society for the Encouragement of Arts, London, vol. vii. viii. p. 90. In the Transactions of the same Society, vol. v. vi. p. 59, Mr. Ailway directed that, in the winter, the walls, frames, &c. of his green and hot houses should be well washed with the following mixture: Take of corrosive sublimate mercury four ounces, and dissolve it in two gallons of water. These houses had been greatly infested with red spiders and ants. After having been washed with the above mixture, neither were to be seen next summer. This wash may be used on old garden walls, and to the roots of fruit-trees infested with insects, if made weaker. It may destroy the tender leaves of plants, though not the roots. This wash will effectually destroy that disagreeable insect the bug, and all other insects of a tender cuticle; and it will not in the least hurt the colour of bed-furniture or hangings. Care must be taken, that the wash be applied into every crevice or folding

of the furniture with a painter's brush. It will sometimes be necessary to repeat the wash, as some of the ova of bugs may remain concealed, notwithstanding the utmost care.

Some of the West India islands were much infested with large ants, which greatly hurt the sugar-canes. The remedy was, to dissolve corrosive sublimate mercury in rum, in the proportion of two drams to a pint of spirits. This solution was poured on dry powdered sugar; and when the sugar was dried, it was laid in the paths of the ants. They ate it, and were destroyed. Might not this practice be imitated, by laying sugar thus prepared on paper or pieces of thin boards near the roots of fruit-trees infested by insects, especially when the fruit is ripening? The papers or boards might be taken in during the night, or when it rained. The sugar should be coloured with indigo, or other substance, thereby to mark it as a substance to be avoided by curious idlers.

2. We are informed that a person in Philadelphia employed brimstone in the following manner: Having cleared all round the roots of trees infested with caterpillars or other insects, he strewed some flower of brimstone round the roots, and covered it with a thin sprinkling of fine mould, that it might not be blown away by the wind, yet so that the sun might operate through, and cause the brimstone to fumigate. Thus he destroyed the caterpillars. One pound he found sufficient for 200 trees. In that hot climate the sun may perhaps have that effect; but it scarcely will in this. He also employed sulphur in the following manner to drive insects from tall trees: He split the end of a pole, and put in the slit some matches, set them on fire, and held them under the parts of the trees chiefly affected. A pole thus armed he found would answer for three or four trees. Brimstone thus mixed with damp straw, and set on fire, for instance, in hop-grounds infested with the fly, might be of use to drive away the fly.

Sheep are liable to an eruption on the skin, known by the name of the *scab*. The brimstone, when added to the mercurial ointment recommended for that disorder in the Transactions of the Society for the Encouragement of Arts, vol. vii. p. 90, might perhaps render the application more efficacious and less dangerous.

3. The natives of hot countries are taught by experience, that an unctuous covering on their bodies prevents the bites of musquitoes and all gnats. The white inhabitants in such countries are not sufficiently careful in preventing the least stagnant water near their dwellings, in which the musquitoes are bred; even in the waste water thrown out they are produced. Dr. Franklin, by a careful attention to this circumstance, guarded his family in Philadelphia from such insects: one day seeing a number of musquitoes in his library, he found on enquiry, that one of his servants had taken the cover off a tub placed near his window for receiving rain-water. On such an occasion the remedy is easy, viz. shutting the room up for the day, so that the musquitoes cannot come at any water, in which time they die. Though this caution may seem trifling to us who live in a mild climate, it is far otherwise in hot countries.

We are informed, in the Transactions of the Society for the Encouragement of Arts, vol. v. p. 45, that Mr. Winter, among other experiments on turnip-seed, steeped the seed 24 hours in a sufficient quantity of train-oil. He then drained the oil from the seed, which he mixed with a quantity of fine sifted earth, and immediately sowed it in drills. When the plants began to appear on the surface, the ground was sown with foot. He found that seed steeped in lintseed-oil answered equally well. The turnips the least injured by the fly were those that grew from seed steeped as above, which grew so luxuriantly as to produce rough leaves several days prior to the most flourishing of any of his other experiments, and were the better enabled to withstand the fly's attack. The leaves of

these turnips were of a darker green, and appeared twice as thick in bulk and luxuriance as the other turnips, and were a considerable deal larger. The seed was drilled an inch and a half deep, and at a foot distance in the rows. Train oil is apt to kill the leaves of plants which have been injured by insects; but linseed oil has not that effect, though equally destructive to the insects. The train oil seems to act both as an oil, and by its disagreeable smell it prevents insects approaching it. In this respect it may be successfully used to prevent field-mice or other vermin preying on acorns, chestnuts, or other seeds sown in it before they are sown.

When thus giving directions for preventing the fly on turnips, a late experiment should be mentioned, by the disclosing of which a person gained a considerable reward. His secret was, running a roller over the ground early in the morning, while the dew remained on the ground, on the first appearance of the fly. The dew entangled the flies so much, that they could not make their escape, and were therefore crushed to death. As the roller may leave the surface of the earth too hard, some very properly advise to fix some boughs of elder in a gate or hurdle, to be drawn over the field; and if the boughs had been before fumigated with the smoke of tobacco, or tincture of assafoetida, the success would be the surer. The most certain method of preventing the hurt done by the fly is to raise the plants in a nursery, and at a proper age to transplant them, being carried to the ground in a wheel-barrow filled with manure softened with water so as to admit the plants. This method will secure their more speedy growth. In the nursery the attack of the fly may be prevented by sprinkling foot or quicklime on the ground. The utility of transplanting turnips is evident by the practice of transplanting the turnip-rooted cabbage. They who are discouraged from this practice by the expence attending it, do not reflect that the hoeing is prevented, and the plants grow the better, being set in fresh earth.

4. Before proceeding to direct the use of the last means mentioned, viz. tobacco, for destroying insects in turnips, it may be proper to mention an experiment made by Mr. Green, of her majesty's flower-garden at Kew. He contrived a pair of bellows, similar to that employed in recovering people seemingly drowned. It has a cavity in the nozzle, in which some tobacco is put, with a live coal over it. The bellows being then worked, the tobacco is set on fire, and the smoke is directed to any particular spot. A lady was fond of having the moss-rose in her dressing-room, but was prevented having it on account of the green insects which constantly adhere to that plant. To remedy this inconvenience, Mr. Green had a box made large enough to contain a pot in which a plant of the moss-rose grew. In one end of the box was a hole, to admit the nozzle of the bellows; the bellows was worked, and the smoke was received into the box. When the tobacco was consumed, the nozzle was withdrawn; and a cork being put into the hole, the box thus remained till morning, when the insects were all laid dead on the earth. Being swept off, the plant was in a state fit for a dressing-room. Many plants thus infested with insects may be too large, or otherwise so placed as not to be put into a box. In this case it occurred to the writer of these observations, that being sprinkled with an infusion of tobacco in water might in some degree answer the same purpose. On trial he found it answer, and he thus freed other plants of their insects. He also used it on trees of easy access with advantage. Train oil is so inimical to tender plants or leaves, that it destroys them if insects have in the least hurt them; whereas the infusion, instead of killing the leaves, promoted a fresh vegetation.

Fruit trees often become the prey of insects. Those against

a wall, or in espaliers, being easily come at, much of the mischief may be prevented by cutting off the leaves so soon as they are observed to be emiled; for then fresh eggs are laid on them, probably by butterflies. If sprinkled with the infusion of tobacco, it will prevent their coming to life. After the fruit is formed, the infusion must not be used, lest the taste and smell may remain. The scissars are then the proper remedies, which ladies may employ as amusement, and may thereby present fruit to their friends of their own preserving. A ley of the ash of plants sprinkled on the leaves may have a good effect, as also on other pot-herbs, which are often the prey of caterpillars. As many insects, besides those bred on the leaves or in the walls, may destroy the fruit, the sugar with the corrosive sublimate, as already described, may be laid in the way of other insects, to all which it will prove a speedy death. Diligent inspection into their retreats is the most certain means of preventing the loss sustained by snails. Ants are prevented rising up the trees, by laying round the roots powdered chalk, or any other substance which by entangling their feet prevents their crossing it. Care should be taken to destroy their nests every where near the garden.

The hop is now become an article of so great consequence, that it deserves our particular attention. Early in its growth, when the vines begin to ascend the poles, a black fly preys on its leaves, frequently in such numbers, as, by destroying the leaves, to interrupt the vegetation, much of the food of plants being absorbed by the leaves. The infusion of tobacco destroys them, or at least drives them away so effectually that a plant almost totally stripped of its leaves has put out fresh leaves after the use of it. If care be not taken, they will again fall on the fresh leaves. As the flies lodge on the lower side of the leaves, they are protected from storms of rain, and therefore the infusion must be driven upwards by a forcing pump. As it is said that the expence of tobacco is too great, perhaps lime-water, or even water by itself, driven strongly against the leaves, might drive them away. The labour attending such experiments in a large plantation discourages others, without reflecting that, if such means are used early, the flies may more easily be got rid of. Free ventilation is undoubtedly beneficial to all plants; and hence perhaps the particular advantages of drilling corn in rows a little distant. If alleys somewhat larger than common were made in the plantations of hops, there might be sufficient spaces left where the alleys cross one another to admit of setting damp straw, or other materials mixed with brimstone, foot, &c. on fire. Smoke itself is said to prevent the fly; and if so, it will still act more powerfully when mixed with such materials. It has been observed in Sweden, that the hops grow naturally among heaps of stones or fragments of rocks. They therefore advise to cover the ground round their roots, with stones, which will prevent the insects laying their eggs near the roots in the ground, where they lay them to be protected during the winter. The stones will also preserve moisture at the roots during the summer. A rope cannot be drawn across a plantation of hops, as it can across a field of corn, in case of mildew. Here water to wash off the clammy juice that entices and feeds insects seems to be the only remedy. The plantation being well ventilated, may at least prevent the frequency of it. The forcing pump will most effectually wash off this exudation.

INSERTION, in anatomy, the close conjunction of the vessels, tendons, fibres, and membranes of the body, with some other parts. This term is particularly applied to a muscle, which is said to have its *origin* and its *insertion*.

INSINUATION of a *Will*, among civilians, is the first production of it, or the leaving it with the register in order to its probate. See *WILL*.

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INSITION, **INSITIO**, in botany, denotes the same with engrafting, viz. the act of inserting and uniting a cyon, bud, or the like, in the substance of the stock.

INSOLATION, in pharmacy, a method of preparing certain fruits, drugs, &c. by exposing them to the heat of the sun's rays; either to dry, to mature, or to sharpen them; as is done in vinegar, figs, &c. The word comes from the Latin verb, *insolare*, which is used by Pliny and Columella, and signifies *to expose to the sun*.

INSOLVENT, a term applied to such persons as have not wherewithal to pay their just debts. A person dying, and not leaving estate sufficient to discharge these, is said to die insolvent.

Trial by **INSPECTION**, or **EXAMINATION**, is when, for the greater expedition of a cause, in some point or issue, being either the principal question, or arising collaterally out of it, but being evidently the object of sense, the judges of the court, upon the testimony of their own senses, shall decide the point in dispute. For, where the affirmative or negative of a question is matter of such obvious determination, it is not thought necessary to summon a jury to decide it, who are properly called in to inform the conscience of the court of dubious facts: and therefore, when the fact, from its nature, must be evident to the court either from ocular demonstration or other irrefragable proof, there the law departs from its usual resort, the verdict of 12 men, and relies on the judgment of the court alone. As in case of a suit to reverse a fine for non-age of the cognizor, or to set aside a statute or recognizance entered into by an infant; here, and in other cases of the like sort, a writ shall issue to the sheriff, commanding him that he constrain the said party to appear, that it may be ascertained by the view of his body by the king's justices, whether he be of full age or not: *Ut per aspectum corporis sui constare poterit justiciariis nostris, si prædictus an sit plenæ ætatis necne*. If, however, the court has, upon inspection, any doubt of the age of the party (as may frequently be the case), it may proceed to take proofs of the part; and particularly may examine the infant himself upon an oath of *voir dire, veritatem dicere*; that is, to make true answers to such questions as the court shall demand of him: or the court may examine his mother, his god-father, or the like.

INSPECTOR, a person to whom the care and conduct of any work is committed. *Inspectors*, in the Roman law, were such persons as examined the quality and value of lands and effects, in order to the adjusting or proportioning taxes and impositions to every man's estate. The Jews also have an officer, in their synagogue, whom they call *inspector*, חֲבֵזֵן *hbazen*. His business consists principally in inspecting or overlooking the prayers and lessons, in preparing and showing them to the reader, and in standing by him to see he reads right; and, if he makes mistakes, he is to correct him.

INSPIRATION, among divines, &c. implies the conveying of certain extraordinary and supernatural notices or motions into the soul, or it denotes any supernatural influence of God upon the mind of a rational creature, whereby he is formed to any degree of intellectual improvements, to which he could not, or would not, in fact have attained in his present circumstances in a natural way. Thus the prophets are said to have spoken by divine inspiration.

Some authors reduce the inspiration of the sacred writers to a particular care of Providence, which prevented any thing they had said from failing or coming to nought; maintaining, that they never were really inspired either with knowledge or expression. According to M. Simon, inspiration is no more than a direction of the Holy Spirit, which never permitted the sacred writers to be mistaken. It is a common opinion,

that the inspiration of the Holy Spirit regards only the matter, not the style or words; and this seems to fall in with M. Simon's doctrine of direction.

Theological writers have enumerated several kinds of inspiration: such as an inspiration of superintendency, in which God does so influence and direct the mind of any person, as to keep him more secure from error in some various and complex discourse, than he would have been merely by the use of his natural faculties; plenary superintendant inspiration, which excludes any mixture of error at all from the performance so superintended; inspiration of elevation, where the faculties act in a regular, and, as it seems, in a common manner, yet are raised to an extraordinary degree, so that the composition shall, upon the whole, have more of the true sublime or pathetic, than natural genius could have given; and inspiration of suggestion, when the use of the faculties is superseded, and God does, as it were, speak directly to the mind, making such discoveries to it as it could not otherwise have obtained, and dictating the very words in which such discoveries are to be communicated, if they are designed as a message to others. It is generally allowed that the New Testament was written by a superintendant inspiration; for without this the discourses and doctrines of Christ could not have been faithfully recorded by the evangelists and apostles: nor could they have assumed the authority of speaking the words of Christ, and evinced this authority by the actual exercise of miraculous powers: and besides, the sacred writings bear many obvious internal marks of their divine original, in the excellence of their doctrines, the spirituality and elevation of their design, the majesty and simplicity of their style, the agreement of their various parts, and their efficacy on mankind; to which may be added, that there has been in the Christian church, from its earliest ages, a constant tradition, that the sacred books were written by the extraordinary assistance of the Spirit, which must at least amount to superintendant inspiration. But it has been controverted whether this inspiration extended to every minute circumstance in their writings, so as to be in the most absolute sense plenary. Jerom, Grotius, Erasmus, Episcopius, and many others, maintain that it was not; whilst others contend, that the emphatical manner in which our Lord speaks of the agency of the Spirit upon them, and in which they themselves speak of their own writings, will justify our believing that their inspiration was plenary, unless there be very convincing evidence brought on the other side to prove that it was not: and if we allow, it is said, that there were some errors in the New Testament, as it came from the hands of the apostles, there may be great danger of subverting the main purpose and design of it; since there will be endless room to debate the importance both of facts and doctrines.

Among the Heathens, the priests and priestesses were said to be divinely inspired when they gave oracles. The poets also laid claim to it; and to this end they always invoked Apollo, and the Muses at the beginning of any great work.

INSPIRATION, in physiology, is understood of that action of the breast, by which the air is admitted within the lungs; in which sense, inspiration is a branch of respiration, and stands opposed to **EXPIRATION**. This admission of the air depends immediately on its spring or elasticity, at the time when the cavity of the breast is enlarged by the elevation of the thorax and abdomen, and particularly by the motion of the diaphragm downwards: so that the air does not enter the lungs, because they are dilated; but those dilate, because the air enters within them. Nor is it the dilation of the breast which draws in the air, as is commonly thought, though this is a condition absolutely necessary to inspiration; but an actual intrusion of the air into the lungs. See **RESPIRATION**.

INSPISSATING, in pharmacy, an operation whereby a liquor is brought to a thicker consistence, by evaporating the thinner parts.

INSBRUCK, a city of Germany, in the circle of Austria, and capital of the county of Tyrol, received its name from the river Inn, which runs by it. It has a noble castle or palace, formerly the residence of the archdukes of the house of Austria, with a cathedral where they are buried. The houses, though built in the German taste, are rather handsomer; and the streets, though narrow, are remarkably well paved. For the defence of this city the inhabitants can place but little confidence in their fortifications, which are very trifling. They seem rather to depend on the natural fastnesses of their country; which appear indeed to form a barrier, so perfectly inaccessible to any enemy, that even the great Gustavus Adolphus, after having over-run with his victorious arms the other parts of Germany, could never make any impression upon this. It is seated in a pleasant valley, in E. long. 11. 27. N. lat. 47. 3.

INSTALMENT, or **INSTALLATION**, the act of giving visible possession of an order, rank, or office, by placing in the proper seat. The word is derived from the Latin *in*, and *stallum*, a term used for a seat in church, in the choir, or a seat or bench in a court of justice, &c. though Vossius is of opinion the word is of German origin. **INSTALMENT** is chiefly used for the induction of a dean, prebendary, or other ecclesiastical dignitary, into the possession of his stall, or proper seat in the cathedral church to which he belongs. This is sometimes also called *installation*.

INSTALMENT is likewise used for the ceremony whereby the knights of the garter are placed, in their rank, in the chapel of St. George at Windsor.

INSTANT, a point of duration in which we perceive no succession; or it is that which takes up the time only of one idea in our minds.

INSTAURATION, the re-establishment or restoration of a religion, a church, or the like, to its former state. The word is by some derived from the old Latin *instaurum*, which signified the "stock" of things necessary for the tilling and managing of grounds; as cattle, tools, harness, &c. But the word *instaurum* is only of the middle age; *instauratio* is of much greater antiquity, and by some derived from *instar* "like;" as importing a thing's being brought to its former likeness or appearance. See **RESTAURATION**.

INSTEP, in the manege, is that part of a horse's hind leg which reaches from the ham to the pattern-joint.

INSTINCT, a natural disposition, or sagacity, wherewith animals are endued; and by virtue whereof they are enabled to provide for themselves, and know what is good for them, and are determined to preserve and propagate their species.

INSTINCT in brutes bears some analogy to reason in men. There have been many systems adopted to explain the principles which produce and direct the spontaneous actions of brute animals. Many of the ancient philosophers ascribed to brutes an understanding differing only in degree from that of man, and attributed their inferiority to the want of proper and sufficient bodily organs. This system has been lately very strenuously supported by M. Helvetius, *De l'Esprit*, tom. i. p. 2, &c. Among the moderns, the learned Cudworth endeavoured to explain the instinct of animals by means of a certain **PLASTIC nature**. Des Cartes thought that all the actions of brute animals might be explained by the simple laws of mechanism, and considers them as machines totally devoid of life and sentiment, but so curiously constructed by the Creator, that the mere impressions of light, sound, and other external agents on their organs, produced a series of motions in them, and caused them to execute those various operations, which had before been ascribed to an internal principle of life and

spontaneity. But the actions and manners of animals, which are totally incompatible with the mere principles and laws of mechanism, evince the absurdity of this opinion. M. Buffon adopts the opinion of Des Cartes in part, but grants them life, and the faculty of distinguishing between pleasure and pain, together with a strong inclination to the former, and aversion from the latter. By these inclinations and aversions he undertakes to account for all, even the most striking operations of animals; affirming, that, in consequence of impressions made on the brain, by means of the sensitive organs, and by the re-action of the brain and nerves on the muscles, these machines acquire a motion conformable to the nature of the animal, and of the impressions of the different objects which act upon their organs, and excite desire or aversion. See **BRUTES**.

The *pre-established harmony* of Leibnitz has also been applied to explain the actions of brute animals. Others have considered the actions of animals as produced by the constant and immediate influence of the divine energy, directing all their inclinations and motions: such appears to have been the opinion, however unphilosophical it must appear, of Mr. Addison, in the second volume of the *Spectator*. The late ingenious Hermann Samuel Reimar, professor of philosophy at Hamburg, has enumerated and exposed these and other opinions, with regard to the instinct of animals, in his *Observations Physiques*, &c. published in 2 vols. 12mo. at Amsterdam and Paris, 1770; and, defining *instinct*, in the most comprehensive sense of the word, to be every natural inclination, accompanied with a power, in animals, to perform certain actions, divides instincts into three heads. The first, which he calls *mechanical instincts*, belong to the body, considered as an organized substance, and are exercised blindly and independently of the will of the animal. Such are those which produce the motion of the heart and lungs, the contraction and dilatation of the pupil, digestion, &c. This class of instincts is possessed in common both by men and brutes, and in some measure even by vegetables. The second class comprehends those which he terms *representative instincts*, which consist partly in the power of perceiving external objects by their present impression on the senses, and partly in the faculty of rendering the ideas of these objects present to the mind by the powers of imagination, or of memory, in a lax sense of the word. These are common to men and other animals, excepting that brutes possess only the faculty of imagination in common with us, and not that of memory, in the strict and proper sense of the word. Indeed this author endeavours to prove, that the knowledge of brutes does not merely differ in degree from that of man, but that it is of a kind entirely different from it; and that they are incapable both of memory and reasoning; the faculty of imagination serving to give them a confused idea of events that are past, by the view, or other impressions of objects that are present. The third and principal class of instincts is that which comprehends all those which M. Reimar call *spontaneous*. This species of instinct is not attended with any power of reflection, determining the animal to decide freely between two different modes of action present to his imagination; nor is it merely corporeal or mechanical. It is put into action by the natural and primitive principle of self-love implanted in all animated beings; or by a love of pleasure and aversion to pain, producing a voluntary inclination to perform certain actions which tend to their well-being and preservation. To the performance of these actions they are particularly prompted by their present sensations, by imagination supplying the place of memory, and by other causes. The wonderful effects produced by these instinctive appetites, are farther to be attributed to the exquisite mechanism in their bodily conformation, particularly in the structure of the various organs with which they execute their

operations, and to the superior perfection and acuteness of their external senses, by which they are quickly and distinctly informed of those qualities of objects which most materially concern them. In order to account for the more curious and surprising operations of brute animals, M. Reimar adds two other principles, viz. 1st. an internal distinct perception of the precise power and proper use of their various bodily organs, together with an innate knowledge of the qualities of those objects around them in which they are interested; and 2dly, certain innate and determinate powers and inclinations, impressed by the Author of Nature, *à priori*, on the soul itself; by which they are arbitrarily, and without their own knowledge or consciousness, directed and irresistibly impelled to the performance of these various operations which they execute with such unremitting industry and art. These determinate forces, which constitute the principal part of M. Reimar's system, are no where so visible and distinguishable as in that numerous set of instincts which he classes under the title of the *industrious* instincts of animals. For a further account of this system we must refer to the work itself, or to an abstract of it, with several of the author's illustrations, in the Monthly Review, vol. xlv. p. 533, &c.

INSTITUTES, in literary history, a book containing the elements of the Roman law. The institutes are divided into four books; and contain an abridgment of the whole body of the civil law, being designed for the use of Students. See **LAW**.

INSTITUTION, in general, signifies the establishing or founding something.—In the canon and common law, it signifies the investing a clerk with the spiritualities of a rectory, &c. which is done by the bishop, who uses the following formula: "I institute you rector of such a church with the cure of souls, and receive your care and mine."

INSTITUTIONS, in literary matters, denote a system of the elements or rules of any art or science. Thus, physical or medicinal institutions are such as teach the necessary *præcognita* to the practice of medicine, or the cure of diseases.

INSTRUMENT, in general, whatever is subservient to a cause in producing any effect.

Mathematical, Philosophical, &c. **INSTRUMENTS**. See **ASTRONOMY**, **ELECTRICITY**, **GEOMETRY**, **LEVELLING**, **MECHANICS**, **OPTICS**, **PNEUMATICS**, &c. &c.

INSTRUMENT is also used in law, to signify some public act, or authentic deed, by means whereof any truth is made apparent, or any right or title established, in a court of justice.

INSUBRIUM, **AGER**, in ancient geography, a district of the Transpadana; situated between the Ticinus to the west, the Addua to the east, the Padus to the south, and Orobii to the north. The people are called *Insabres* by Livy, *Insubri* by Ptolemy, and *Isambres* by Strabo. Now the Duchy of Milan.

INSULAR, any thing belonging to an island. Insular situations are productive of many happy consequences to the inhabitants, both with respect to the climate, security, and convenience for commerce. See **ISLAND** and **COAST**.

INSULATED, in architecture, an appellation given to such columns as stand alone, or free from any contiguous wall, like an island in the sea; whence the name.

INSULATED, in electrical experiments. When any body is prevented from communicating with the earth by the interposition of an electric body, it is said to be *insulated*. See **ELECTRICITY**.

INSURANCE, in law and commerce, a contract, whereby one party engages to pay the losses which the other may sustain, for a stipulated premium or consideration. The most common sorts are, Insurance against the dangers of the seas, insurance against fire, insurance of debts, and insurance of lives.

I. **INSURANCE against Losses at Sea**, is a most beneficial institu-

tion, for promoting the security of trade, and preventing the ruin of individuals; and is now conducted by a regular system of rules, established by the interposition of the legislature, the decision of the courts of justice, and the practice of merchants.

It is carried on to the best advantage by public companies, or by a considerable number of private persons, each of whom only engages for a small sum, on the same vessel. There are two public companies established by authority of parliament, viz. the London and Royal Exchange Insurance-Companies. For procuring subscription by private persons, brokers are generally employed, who extend the policy or contract of insurance, procure subscriptions, and assist at settling losses. They are entitled to an allowance for their trouble, generally 5 *per cent.* on premiums, and 2 *per cent.* on losses.

The parties who engage to pay the damage are called the *insurers* or *under-writers*: the parties for whose security they engage, are called the *insured*; and the premium is understood to be paid when the insurance is made. On this subject, we shall consider, What is necessary to render an insurance valid: When the risk commences, and when it terminates: What constitutes a total or a partial loss: What proof of loss is necessary: and, How the loss is adjusted.

First, In order to render an insurance valid, the insured must have property really at stake; the voyage must take place under the circumstances agreed on; the dangers insured against must not be contrary to law; and a candid account must be given of circumstances which enhance the danger.

1. The condition of possessing property was required by 19 Geo. II. c. 37. to prevent ships from being fraudulently destroyed when insured above their value; and to discourage a practice which had become common, of converting policies to the purpose of mere wagers. In transactions of this kind, as the insured had no property, and could claim no indemnification for partial damage; so the insurers, having lost their wager by the ship's being lost, could claim no abatement, though part was saved: accordingly, the policies contained clauses of interest or no interest, free from average, and without benefit of salvage. All such policies are declared invalid.

This restriction does not extend to privateers, nor to ships trading to the Spanish or Portuguese plantations.

Insurances are commonly made as interest shall appear; and it is incumbent on the insured to prove the value of his property. The value of the goods may be proved by the invoices; and the cocquet must be produced, if required, to instruct that the goods were actually shipped. It is admitted to value the ship at prime cost and charges, deducting the freights that have been drawn since purchased, if the proprietors choose to stand to that rule; but they are not restricted to it. Sometimes the value of the ship or goods is expressed in the policy; and this value must be admitted, although it be higher than the true one: but it is incumbent on the insured to prove that he had property at stake; and, if the property be trifling in comparison of the sum insured, the insurance will be set aside, as an evasion of the statute.

Expected profits, and bounty on the whale-fishery, if specified in the policy, may be insured.

When the value is less than the sum insured, the owners may claim a return of premium for the excess.

If there be several policies on the same subject, of different dates, the earlier one is valid, and the others must be vacated. If they be of the same date, they must be vacated in equal proportions.

When a policy is vacated, in whole or in part, the under-writers have a right to retain $\frac{1}{2}$ *per cent.* for their trouble.

In the case of a cargo intended for A, but afterwards sent to B, both expected it, and insured, and B claimed for the value on its being lost. The under-writers answered, that it

was a double insurance, and they ought only to pay their proportion. Judgment was given, finding them liable for the whole, and reserving to them any demand competent against the underwriters who insured for A.

Fraudulently to cast away or destroy a ship insured above its value, is felony.

2. If the ship does not proceed on the voyage, or if, being warranted to depart with convoy, it departs without convoy, the insurance must be vacated.

If the extent of a trading voyage be uncertain, the longest one in contemplation is described in the policy, and it is agreed that part of the premium shall be returned if the voyage be shortened. In like manner, in time of war, when insurance is made without condition of convoy, it is agreed that part of the premium be returned in case it sail with convoy.

When a ship is warranted to depart with convoy, it is understood from the usual place of convoy (*e. g.* the Downs), and it is insured till it arrive there.

The common proof of sailing with convoy is the production of sailing-orders; but if a ship be prevented by the weather from receiving the sailing-orders, other proof may be admitted.

A ship was insured from the Thames to Halifax, warranted to sail from Portsmouth with convoy. The convoy had sailed before the ship arrived there, and the underwriters declined to insure it, without convoy, for the rest of the voyage. They were found liable to return part of the premium, retaining only in proportion to the accustomed rate from London to Portsmouth. This decision seems to establish the following principle, that, when the voyage performed is only part of that described in the policy, and when the risk can be proportioned, the underwriters are bound to return part of the premium, though there be no agreement for that purpose.

But, if a ship, insured only against the hazards of the sea, be taken by the enemy, the insured have no right to claim a return of premium, though the capture happen soon, under pretence that little sea-hazard was incurred.

If a ship deviates from the voyage described in the policy without necessity, it sets aside the insurance. An intention to deviate is not sufficient to set it aside; there must be an actual deviation; and, even in that case, the insurers are liable for damages sustained before deviation.

It is no deviation to go out of the way to the accustomed place of convoy, nor to the nearest place where necessary repairs may be had. Deviation, for the purpose of smuggling, if without the knowledge of the owners, does not set aside the insurance, nor when the master is forced by the crew to return.

In insurances to the East Indies, and home, the insurers are understood to take the risk of detention in the country, and of country voyages.

3. Insurance of prohibited goods, against the risk of seizure by the government, is unlawful, and invalid. The insurers, insured, brokers, and all accessories, are liable to the fine of 500*l.*

4. If the insured have any information of more than common danger, they must reveal every such circumstance to the insurers, otherwise the policy is set aside.

This rule is established for the preservation of good faith: and there are several strong decisions in support of it. If a ship be spoke to leaky at sea, or if there be a report of its being lost, these circumstances must be communicated to the insurers. Even the concealment of a false report of loss vitiates the insurance; and, if the ship be afterwards lost, though in a different manner, the insured will recover nothing. In a voyage from Carolina to London, another ship had sailed 10 days after that which was insured, and arrived seven days before the insurance was made; and the concealment of this circumstance, though the fact was not proved to the satisfaction of the jury, was considered as sufficient to set it aside. Also,

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during the continuance of the American war, a ship being insured from Portugal, by the month, without condescending on the voyage, sailed for North America, and was taken by a provincial privateer. The insurers refused to pay, because the hazardous destination was concealed; and it was only upon proof of the insured being equally ignorant of it that they were found liable.

But the insured are not obliged to take notice of general perils, which the insurers are understood to have in contemplation; dangerous navigation, West-Indian hurricanes, enterprizes of the enemy, and the like.

Insurance is not set aside by a mistake in the name of the ship or master, or the like,

Insurance may be made on an uncertain ship; on any ship that the goods may be loaded on; on any ship that A shall sail in from Virginia. In this last case, the policy is no transferred to a ship which A goes on board during the voyage.

Secondly, If a ship be insured at and from a port, the insurance commences immediately if the ship be there, or at its arrival there. If it be damaged when preparing for a voyage, the insurers are liable; but not if the voyage be laid aside for several years, with consent of the owners. Insurance from a port commences when the ship breaks ground; and if it set sail, and be driven back and lost in the port, the insurers are liable.

Insurance on goods generally continues till they be landed; but, if they be sold after the ship's arrival, and freight contracted to another port, the insurance is concluded. Goods sent on board another ship or lighter are not at the risk of the insurer; but goods sent ashore in the long boat are.

Insurance on freight commences when the goods are put on board.

Goods from the East Indies, insured to Gibraltar, and to be re-shipped from thence to Britain, were put on board a store-ship at Gibraltar, to wait an opportunity of re-shipping, and were lost. The custom of putting goods aboard a store-ship being proved, the insurers were found liable.

Loss of sails ashore, when the ship is repairing, is comprehended within the insurance. What is necessarily understood is insured, as well as what is expressed; the essential means, and intermediate steps, as well as the end. Ships performing quarantine are at the risk of the insurer.

Thirdly, The insurers are liable for a total loss when the subject perishes through any of the perils insured against. Baratry, though it properly signifies running away with the ship, extends to any kind of fraud in the master or mariners. Insurance against detention of princes does not extend to ships that are seized for transgressing the laws of foreign countries.

The insurers are also liable for a total loss, when damage is sustained, and the remaining property abandoned or vested in the insurers.

If a ship be stranded, or taken, and kept by the enemy, or detained by any foreign power, or seized for the service of the government, the proprietors have a right to abandon.

But, if a ship be taken by the enemy, and be re-taken, or makes its escape, before action against the insurers; have the insured a right to abandon, or must they only claim for the damages sustained as an average loss? There are opposite decisions, according as the circumstances of the case were strong. When the ship was long detained, the goods perishable, the voyage entirely lost, or so disturbed that the pursuit of it was not worth the freight, or when the damage exceeds half the value of the thing, they have been found entitled to abandon; (*Goss against Withers, 2 Burrow, 683*). But, if the voyage be completed with little trouble or delay, they are not entitled; (*Hamilton against Mendez, 2 Burrow, 1198*).

The insured cannot claim, as for a total loss, on an offer to abandon when the loss is, in its nature, only partial; for, if

this were permitted, they might devolve the loss occasioned by bad markets on the insurers.

And, in all cases, the insured have their option to abandon, or not. They may retain their property if they please, and claim for an average loss; and they must make their option before they claim.

If the goods be so much damaged that their value is less than the freight, the insurers are accountable as for a total loss.

The insurers are liable for general average, when the property is charged with contribution; and for particular average, when the property is damaged, or part of it destroyed.

If the damage be sustained through the fault of the ship, the owners of the goods may have recourse, either against the master or insurers; and, if the insurers be charged, they stand in the place of the owners, and have recourse against the master.

In order to prevent the insurers from being troubled with frivolous demands for average, it is generally stipulated, that none shall be charged under *5 per cent.* or some other determined rate; and corn, flax, fruit, fish, and like perishable goods, are warranted, free from average, unless general, or the ship be stranded.

In order to encourage every effort to save the ship, the insurers are liable for charges laid out with that design, although the subject perish. Thus they may be charged with more than the sum insured.

In case of goods being damaged, the proportion of the sum insured, for which the underwriters are liable, is regulated by the proportion of the prices which the sound and damaged goods fetch at the port of destination. The prime cost of the goods is not considered, nor the necessity of immediate sale, in consequence of damage. Although the damaged goods sell above prime cost, the insurers are liable.

Fourthly, If a ship be lost, and the crew saved, the loss is proved by the evidence of the crew.

If damage be sustained, the extent is proved by an examination of the subject damaged, at the ship's arrival; and the cause by the evidence of the crew.

If the ship be stranded, evidence must be taken at the place where stranded.

Documents of loss must be laid before the underwriters, with all convenient speed; and, if these be sufficiently clear, the loss should be immediately settled. The underwriters generally grant their notes at a month or six weeks date for their proportions.

If a ship be not heard of for a certain time, it is presumed lost; and the underwriters are liable to pay the sums insured, the property being abandoned to them in the event of the ship's return. Six months are allowed for a voyage to any part of Europe, a year to America, and two years to the East Indies.

By the ordinance of Hamburgh, if a ship be three months beyond the usual time of performing a voyage, the underwriters may be desired to pay *92 per cent.* on an abandon. If they decline it, they are allowed 14 months more, and then they must pay the full value.

A ship insured against the hazards of the sea, but not against the enemy, if never heard of, is presumed lost at sea.

Fifthly, In order that the manner of settling losses may be understood, we must explain what is meant by covering property. We mentioned already, that insurances for greater sums than the insured had really at stake, were contrary to law: but some latitude is allowed in that respect; for if the owner were to insure no more than the exact value of his property, he would lose the premium of insurance, and the abatement, if any was agreed on.

For example, if he has goods on board to the value of 100*l.* and insures the same at *5 per cent.* to abate *2 per cent.* in case of loss; then, if a total loss happen, he recovers 98*l.* from the

insurers, of which 5*l.* being applied to re-place the premium, the nett sum saved is only 93*l.*: but, if the value on board be only 93*l.* and the sum insured 100*l.* he would be fully indemnified for the loss; and his property, in that case, is said to be covered.

To find how much should be insured to cover any sum, subtract the amount of the premium and abatement (if any) from 100*l.* As the remainder is to 100*l.* so is the value to the sum which covers it.

In case of a total loss, if the sum insured be not greater than that which covers the property, the insurers must pay it all. If greater, they pay what covers the property, and return the premium on the overplus.

Partial losses are regulated by this principle, that whereas the owner is not fully indemnified, in case of a total loss, unless he covers his property, therefore he should only be indemnified for a partial loss in the same proportion; and if it be not fully insured, he is considered as insurer himself for the part not covered, and must bear a suitable proportion of the loss. Therefore the value of the property is proved, and the sum required to cover it computed. If that sum be all insured, the underwriters pay the whole damage; if only part be insured, they pay their share, which is computed by the following rule: As the sum which covers the property is to the sum insured, so is the whole damage to the part for which the insurers are liable.—For example, if the value of the property be 360*l.* the sum insured 300*l.* the premium *8 per cent.* and abatement *2 per cent.*; then the sum which should be insured to cover the property is 400*l.*; and, if damage be sustained to the extent of 200*l.* the owners will recover 150*l.*

If a voyage is insured out and home, the premium outward must be considered as part of the value on the homeward property, and the sum necessary to cover it computed accordingly. For example, to insure 100*l.* out and home, at *5 per cent.* each voyage, abatement *2 per cent.* we compute thus:

93 : 100 :: L. 100 : L. 107 : 10 : 6, to be insured outward, premium on L. 107 : 10 : 6 outwards, at *5 per cent.* L. 5 : 7 : 6 : 93 : 100 :: L. 105 : 7 : 6 : L. 113 : 6*s.* to be insured home; the premium on which is L. 5 : 13 : 6; and if the ship be lost on the homeward voyage,

From the sum insured home	-	L. 113	6	0
Subtract the discount, <i>2 per cent.</i>	-		2	5
			<hr/>	

Sum for which the insurers are liable	-	L. 111	—	9
Insurance out	-	L. 5	7	6
Insurance home	-	5	13	3
			<hr/>	
			11	—
			<hr/>	

Covered property L. 100 — —

II. INSURANCE against Fire. There are several offices in Britain for this purpose, of which the Sun Fire-office is the most considerable. Insurances are divided into common, hazardous, and doubly hazardous, according to the nature of the subject insured. When the sum insured is high, there is a higher premium *per cent.* demanded; and money, papers, jewels, pictures, and gun-powder, are not comprehended. If a subject be wrong described, in order that it may be insured at a lower premium, the policy is void. The benefit of a policy is transferred, by indorsement, to the representatives of the person in whose favour it was made; and it may be transferred to other houses when the insured changes his habitation. If insurance be made on the same subject in different offices, it must be specified, by indorsement, on the policy; and, in case of loss, the offices pay proportionally. The insurers pay all expences in attempting to extinguish fire, or save goods, though not successful. If the value of a subject be insured in part, and damage be sustained, the insurers pay the whole, if it does not exceed the sum insured.

III. INSURANCE of Debts. See BOTTOMRY.

IV. INSURANCE for Lives. In virtue of this, when the person dies, a sum of money becomes payable to the person on whose behalf the policy of insurance was granted. One of the principal insurance-offices of this kind is that of the Amicable Society for a Perpetual Assurance, kept in Serjeant's-inn, Fleet-street, London.

This society at Serjeant's-inn requires an annual payment of 5 l. from every member during life, payable quarterly. The whole annual income hence arising is equally divided among the nominees, or heirs, of such members as die every year; and this renders the dividends among the nominees, in different years, more or less, according to the number of members who have happened to die in those years. But this society engages that the dividends shall not be less than 150 l. to each claimant, though they may be more.—None are admitted whose ages are greater than 45, or less than 12; nor is there any difference of contribution allowed on account of difference of age.—This society has subsisted ever since 1706, and, its credit and usefulness are well-established. Its plan, however, is liable to several objections. First, it is evident that regulating the dividends among the nominees by the number of members who die every year, is not equitable; because it makes the benefit which a member is to receive to depend, not on the value of his contribution, but on a contingency, that is, the number of members that shall happen to die the same year with him. Secondly, its requiring the same payments from all persons under 45, is also not equitable; for the payment of a person admitted at 12, ought not to be more than half the payment of a person admitted at 45. Thirdly, its plan is so narrow, as to confine its usefulness too much. It can be of no service to any person whose age exceeds 45. It is, likewise, by no means properly adapted to the circumstances of persons who want to make assurances on their lives for only one year, or a short term of years. For example: the true value of the assurance of 150 l. for five years, on the life of a person whose age is 39, may be found, by calculation, to be nearly three guineas *per ann.* supposing interest at 3 *per cent.* and the probabilities of the duration of human life as they are given in Dr. Halley's Table of Observations. But such an assurance could not be made in this society without an annual payment of 5 l. Neither is the plan of this society at all adapted to the circumstances of persons who want to make assurances on particular survivorships. For example: a person possessed of an estate or salary, which must be lost with his life, has a person dependent upon him, for whom he desires to secure a sum of money payable at his death. But he desires this only as a security against the danger of his dying first, and leaving a wife, or a parent, without support. In these circumstances he enters himself into this society; and, by an annual payment of 5 l. entitles his nominee at his death to 150 l. In a few years, perhaps, his nominee happens to die; and having then lost the advantages he had in view, he determines to forfeit his former payments, and to withdraw from the society. The right method, in this case, would have been to have taken from such a person the true value of the sum assured, "on the supposition of non payment, provided he should survive." In this way he would have chosen to contract with the society: and had he done this, he would have paid for the assurance (supposing interest at 3 *per cent.* his age 30, the age of his nominee 30, and the values of lives as given by M. de Moivre) 3 l. 8 s. in annual payments, to begin immediately, and to be continued during the joint duration of his own life, and the life of his nominee.

None of these objections are applicable to the plan of the society which meets at Black-briars bridge, and which has justly styled itself the *Equitable Society for Assurances on Lives and Survivorships*. The business transacted by this society is so

extensive, and it is governed so entirely by calculations founded on the best rules and observations, that it cannot but prove one of the greatest public benefits.

It was established in the year 1762, in consequence of proposals which had been made, and lectures recommending such a design, which had been read by Mr. Dodson, the author of the *Mathematical Repository*. It assures any sums or reversionary annuities, on any life or lives for any number of years, as well as for the whole continuance of the lives; and in any manner that may be best adapted to the views of the persons assured: that is, either by making the assured sums payable certainly at the failure of any given lives, or on condition of survivorship; and also, either by taking the price of the assurance in one present payment, or in annual payment, during any single or joint lives, or any terms less than the whole possible duration of the lives. Any persons, for instance, who depend on incomes which must be lost when they die, or who are only tenants for life in estates, may, if they want to borrow money, be enabled to give sufficient security by assuring such sums as they want to borrow in this society, and assigning the policy; in consequence of which, the lender will, during the term of the assurance, be guarded against all danger of losing his principal by the death of the borrower. In the same way, clergymen, counsellors, persons holding any places of profit, traders, and others, who have families, whose subsistence depends on the continuance of their lives, may here be enabled to make some provision for their families after their decease. All persons who enjoy annuities for the lives of others, may here secure themselves against the loss they would sustain, should they survive the persons on whose lives the annuities depend, by making assurances which should entitle them to any sums payable on condition their survivorship should take place. Any person entitled to an estate, annuity, legacy, or office, after another person, provided he survives, may here secure some equivalent for his family at his decease, provided he does not survive.—Husbands may, in this society, secure annuities for their wives, provided they should leave them widows. Parents, by assuring the lives of their children when infants, till they attain a given age, may secure for them, should they live to that age, such sums as may be necessary to put them out to apprenticeships, or to make capitals or fortunes for them, with which to set out in business, or to marry. Any persons apprehensive of being left without support in old age, when incapable of labour, may, in this society, purchase an annuity, to commence at any future year of his life, and to continue during the remainder of his life; and he may do this at a very small expence, if he is young, and willing to wait for the commencement of his annuity till he is 55 or 60 years of age.

In short, there are no kinds of assurances on lives and survivorships, which this society does not make. In doing this, it follows the rules which have been given by the best mathematical writers on the doctrine of *life annuities* and *reversions*, particularly Mr. Simpson: and, in order to gain such a profit as may render it a *permanent* benefit to the public, and enable it to bear the expences of management, it takes the advantage of making its calculations at so low an interest as 3 *per cent.* and from tables of the probabilities and values of lives in London, where (as in all great towns) the rate of human mortality is much greater than it is in common among mankind.

This society has lately made a particular inquiry into its own state, as to *profit* and *loss*, by all the business it has transacted from its first institution. This inquiry was made in three different methods, proposed to the directors by Dr. Price, the author of the *Treatise on Reversionary Payments*; and the result has been, that it appears, that a much smaller proportion of the persons assured have died than *should* have died, according to the tables for London, from which the calculations have been made, or even according to Dr. Halley's table for Breslaw; that, for this reason, the claims have been much less than they

should have been; and that the society has for many years been enjoying an income some thousands *per annum* greater than it wants, and a *surplus stock* of near L. 40,000 over and above what is necessary to enable it to make good all its engagements.

In these circumstances, the society finding itself well secured against future hazards, and being unwilling to take from the public an extravagant profit, have determined to reduce all the *future* payments for assurances *one-tenth*; and also to return to the persons now assured *one tenth* of all the payments which they have made. And there is, it seems, reason to expect, that this will be only a preparation for farther reductions. Nor need the public, we are informed, be apprehensive of their going too far in making reductions; for, in consequence of the inquiry they have lately made, and of the order into which this inquiry has thrown their accounts, they will have it in their power to determine exactly from year to year what they are able to do, and always to keep under their view a clear state of their own circumstances.

From the preceding account of this society, it is manifest, that its business is such that none but skilful mathematicians are qualified to conduct it. The interest of the society therefore absolutely requires, that it should make the places of those who manage its business so advantageous as to induce the ablest mathematicians to accept them; and this will render it the more necessary for the society to take care, on any future vacancies, to pay no regard, in filling them up, to any other considerations than the ability and integrity of the candidates. The consequence of granting good pay will be a multitude of solicitations on every vacancy, from persons who, however unqualified, will hope for success from their connections, and the interest they are able to make; and should the society, in any future time, be led by such causes to trust its business in the hands of persons not possessed of sufficient ability as *calculators* and *mathematicians*, such mistakes may be committed as may prove in the highest degree detrimental. We have reason to know, that at present the society is in no danger of this kind; and one of the great public advantages attending it is, that it has established an *office*, where not only the business we have described is transacted with faithfulness and skill, but where also all who want solutions of any questions relating to life annuities and reversions may apply, and be sure of receiving just answers.

TABLE of the Rates of Assurance on Single Lives in the Society for Equitable Assurances near Black-Friars Bridge.

Sum assured L. 100.

Age	One Year			Seven years at an annual payment of			For the whole life, at an annual payment of		
	£.	s.	d.	£.	s.	d.	£.	s.	d.
10	1	9	6	1	10	7	2	2	10
15	1	11	0	1	12	7	2	6	6
20	1	13	11	1	16	0	2	12	10
25	1	17	7	2	0	2	3	0	6
30	2	2	6	2	6	0	3	8	11
35	2	8	7	2	14	2	3	17	9
40	2	19	2	3	5	1	4	7	11
45	3	11	0	3	18	6	5	0	0
50	4	4	8	4	11	2	5	12	11
55	5	0	9	5	11	7	6	9	3
60	5	19	1	6	16	10	7	17	7
65	7	0	11	8	13	0	10	3	9

These rates are 10 *per cent.* lower than the true values, according to the decrements of life in London, reckoning interest at 3 *per cent.*; but at the same time, for all ages under 50, they are near a *third* higher than all the true values, according to Dr. Halley's Table of the decrements of life at Breslaw, and Dr.

Price's Tables of the decrements of life at Northampton and Norwich.—As therefore this society has lately found, that the decrements of life among its members have hitherto been lower than even those given in these last Tables, it may be reasonably expected that they will in time reduce their rates of assurance to the true values by these Tables.

Re-INSURANCE is a second contract, made by an insurer, to transfer the risk he has engaged for to another. It is in general forbidden by 19 Geo. II. c. 37. but is permitted to the representatives of an insurer in case of his death, or to his assignees in case of his bankruptcy; and it must be mentioned in the policy that it is a re-insurance.

INTAGLIOS, precious stones, on which are engraved the heads of great men, inscriptions, and the like; such as we frequently see set in rings, seals, &c.

INTEGER, in arithmetic, a whole number, in contradistinction to a fraction.

INTEGRAL, or INTEGRANT, in philosophy, appellations given to parts of bodies which are of a similar nature with the whole: thus filings of iron have the same nature and properties as bars of iron. Bodies may be reduced into their integrant parts by triture or grinding, limation or filing, solution, amalgamation, &c. See GRINDING, &c.

INTEGUMENTS, in anatomy, denote the common coverings which invest the body; as the cuticula, cutis, &c. What are called the *common integuments*, are, the skin, with the fat and cellular membrane adhering to it. See ANATOMY. The term *Integument* is also extended to the particular membranes which invest certain parts of the body; as the coats or tunics of the eye.

INTELLECT, a term used among philosophers, to signify that faculty of the soul usually called the *understanding*. See LOGIC and METAPHYSICS.

INTENDANT, one who has the conduct, inspection, and management, of any thing. See SUPERINTENDANT. This in the time of the monarchy was a title very frequent among the French. They had *Intendants of the marine*, who were officers in the sea-ports, whose business it was to take care the ordinances and regulations relating to sea-affairs were observed: *Intendants of the finances*, who had the direction of the revenues: *Intendants of provinces*, who were appointed by the king to take care of the administration of justice, policy, and finances in the provinces: also *Intendants of buildings, of houses*, &c. The term is still retained in certain offices under the Republic.

INTENDMENT, in law, is the intention, design, or true meaning, of a person or thing, which frequently supplies what is not fully expressed; but though the intent of parties in deeds and contracts is much regarded by the law, yet it cannot take place against the rules of law.

INTENDMENT of Crimes; this, in case of treason, where the intention is proved by circumstances, is punishable in the same manner as if it was put in execution. So, if a person enter a house in the night-time, with an intent to commit burglary, it is felony; also, an assault, with an intent to commit a robbery on the highway, is made felony, and punished with transportation, 7 Geo. II. c. 21.

INTENT, in the civil law, signifies to begin, or commence, an action or process.

INTENTION, in medicine, that judgment or method of cure which a physician forms to himself from a due examination of the symptoms of a disease.

INTENTION, in physics, the increase of the power or energy of any quality; as heat, cold, &c. by which it stands opposed to *remission*, which signifies its decrease or diminution.

INTENTION, in metaphysics, denotes an exertion of the intellectual faculties with more than ordinary vigour; when the mind with earnestness fixes its view on any idea, considers it on all sides, and will not be called off by any solicitation.

INTERAMNA, in ancient geography, so called from its

situation between rivers, or in an island in the river Nar; a town of the Cisalpine Umbria. *Interamnates* the people; surnamed *Narles* by Pliny, to distinguish them from the people of other Interamnæ. Now *Terni*; a town in the Pope's territory in Umbria. E. lon. 13. 38. N. Lat. 42. 40.

INTERAMNA, a town and colony of the Volsci in Latium, on the confines of Samnium, at the confluence of the rivers Liris and Melpis; and for distinction sake called *Lirinas*. The town is now in ruins.

INTERAMNA, or *Interamnina Prætutianorum* (Ptolemy); a town in the territory of the Prætutiani, a part of the Picenum. Now *Teramo*, in the Abruzzo of Naples. E. lon. 15. N. lat. 42. 40.

INTERCALARY, an appellation given to the odd day inserted in leap-year; which was so called from *calo, calare*, "to proclaim," it having formerly been proclaimed by the priests with a loud voice.

INTERCATIA, in ancient geography, a town of the Vaccæi in the Hither Spain. Here Scipio Æmilianus slew a champion of the barbarians in single combat; and was the first who mounted the wall in taking the town. It was situated to the south-east of Asturica; now said to be in ruins.

INTERCESSION (*intercessio*), was used in ancient Rome, for the act of a tribune of the people, or other magistrate, by which he inhibited the acts of other magistrates; or even, in case of the tribunes, the decrees of the senate. *Veto* was the solemn word used by the tribunes when they inhibited any decree of the senate or law proposed to the people. The general law of these intercessions was, that any magistrate might inhibit the acts of his equal or inferior; but the tribunes had the sole prerogative of controlling the acts of every other magistrate, yet could not be controlled themselves by any.

INTERCESSOR, from *inter* and *cedo* "I go between", a person who prays, expostulates, or intercedes, in behalf of another. In the Roman law, intercessor was the name of an officer, whom the governors of provinces appointed principally to raise taxes and other duties.

INTERCESSOR is also a term heretofore applied to such bishops as, during the vacancy of a see, administered the bishoprick till a successor to the deceased bishop had been elected. The third council of Carthage calls these *interventors*.

INTERCOLUMNIATION, in architecture, denotes the space between two columns, which is always to be proportioned to the height and bulk of the columns.

INTERCOSTAL, in anatomy, an appellation given to such muscles, nerves, arteries, and veins, as lie between the ribs.

INTERDICT, an ecclesiastical censure, by which the church of Rome forbids the performance of divine service in a kingdom, province, town, &c. This censure has been frequently executed in France, Italy, and Germany; and in the year 1170, pope Alexander III. put all England under an interdict, forbidding the clergy to perform any part of divine service, except baptizing of infants, taking confessions, and giving absolution to dying penitents. But this censure being liable to the ill consequences of promoting libertinism and a neglect of religion, the succeeding popes have very seldom made use of it. There was also an interdict of persons, who were deprived of the benefit of attending on divine service. Particular persons were also anciently interdicted of fire and water, which signified a banishment for some particular offence: by their censure no person was allowed to receive them, or allow them fire or water; and being thus wholly deprived of the two necessary elements of life, they were doubtless under a kind of civil death.

INTEREST, is a sum reckoned for the loan or forbearance of another sum, or principal, lent for, or due at, a certain time, according to some certain rate or proportion; being estimated

usually at so much per cent. or by the 100. This forms a particular rule in Arithmetic. The highest legal interest now allowed in England, is after the rate of 5 per cent. per annum, or the 20th part of the principal for the space of a year, and so in proportion for other times, either greater or less. Except in the case of pawn-brokers, to whom it has lately been made legal to take a higher interest, for one of the worst and most destructive purposes that can be suffered in any state. Interest is either Simple or Compound.

Simple INTEREST, is that which is counted and allowed upon the principal only, for the whole time of forbearance. The sum of the Principal and Interest is called the Amount. As the interest of any sum, for any time, is directly proportional to the principal sum and time; therefore the interest of 1 pound for one year being multiplied by any proposed principal sum, and by the time of its forbearance, in years and parts, will be its Interest for that time. That is, if

r = the rate of interest of 1*l.* per annum,

p = any principal sum lent,

t = the time it is lent for, and

a = the amount, or sum of principal and interest;

then is prt = the interest of the sum p , for the time t , at the rate r ; and consequently $p + prt = p \times 1 + rt = a$, the amount of the same for that time. And from this general theorem, other theorems can easily be deduced for finding any of the quantities above mentioned; which collected all together, will be as follow:

1st, $a = p + prt$ the amount,

2d, $p = \frac{a}{1 + rt}$ the principal,

3d, $r = \frac{a - p}{pt}$ the rate,

4th, $t = \frac{a - p}{pr}$ the time.

For example, let it be required to find in what time any principal sum will double itself, at any rate of Simple Interest. In this case we must use the first theorem $a = p + prt$, in which the amount a must be $= 2p$ or double the principal, i. e.

$p + prt = 2p$; and hence $t = \frac{1}{r}$; where r being the interest

of 1*l.* for one year, it follows that the time of doubling at Simple Interest, is equal to the quotient of any sum divided by its Interest for one year. So that, if the rate of Interest

be 5 per cent. then $\frac{100}{5} = 20$ is the time of doubling.

Or the 4th theorem immediately gives

$$t = \frac{a - p}{pr} = \frac{2p - p}{pr} = \frac{2 - 1}{r} = \frac{1}{r}.$$

For more readily computing the interest on money, various Tables of numbers are calculated and formed; such as a Table of interest of 1*l.* for any number of years, and for any number of months, or weeks, or days, &c. and at various rates of Interest.

Another Table is the following, by which may be readily found the Interest of any sum of money, from 1 to a million of pounds, for any number of days, at any rate of Interest.

Sumo.	l.	s.	d.	q.	No.	l.	s.	d.	q.
1000000	2739	14	6	0.99	100	0	5	5	3.01
900000	2465	15	0	3.29	90	0	4	11	0.71
800000	2191	15	7	1.59	80	0	4	4	2.41
700000	1917	16	1	3.89	70	0	3	10	0.11
600000	1643	16	8	2.19	60	0	3	3	1.81
500000	1369	17	3	0.49	50	0	2	8	3.51
400000	1095	17	9	2.79	40	0	2	2	1.21
300000	821	18	4	1.10	30	0	1	7	2.90
200000	547	18	10	3.40	20	0	1	1	0.60
100000	273	19	5	1.70	10	0	0	6	2.30
90000	246	11	6	0.33	9	0	0	5	3.67
80000	219	3	6	2.96	8	0	0	5	1.04
70000	191	15	7	1.59	7	0	0	4	2.41
60000	164	7	8	0.22	6	0	0	3	3.78
50000	136	19	8	2.85	5	0	0	3	1.15
40000	109	11	9	1.48	4	0	0	2	2.55
30000	82	3	10	0.11	3	0	0	1	3.89
20000	54	15	10	2.74	2	0	0	1	1.26
10000	27	7	11	1.37	1	0	0	0	2.63
9000	24	13	1	3.23	0.9	0	0	0	2.37
8000	21	18	4	1.10	0.8	0	0	0	2.10
7000	19	3	6	2.96	0.7	0	0	0	1.84
6000	16	8	9	0.82	0.6	0	0	0	1.58
5000	13	13	11	2.68	0.5	0	0	0	1.32
4000	10	19	2	0.55	0.4	0	0	0	1.05
3000	8	4	4	2.41	0.3	0	0	0	0.79
2000	5	9	7	0.27	0.2	0	0	0	0.53
1000	2	14	9	2.14	0.1	0	0	0	0.26
900	2	9	3	3.12	0.09	0	0	0	0.24
800	2	3	10	0.11	0.08	0	0	0	0.21
700	1	18	4	1.10	0.07	0	0	0	0.18
600	1	12	10	2.08	0.06	0	0	0	0.16
500	1	7	4	3.07	0.05	0	0	0	0.13
400	1	1	11	0.05	0.04	0	0	0	0.11
300	0	16	5	1.04	0.03	0	0	0	0.08
200	0	10	11	2.03	0.02	0	0	0	0.05
100	0	5	5	3.01	0.01	0	0	0	0.03

The Rule for using the Table is this: Multiply the principal by the rate, both in pounds; multiply the product by the number of days, and divide this last product by 100; then take from the Table the several sums which stand opposite the several parts of the quotient, and adding them together will give the interest required.

Ex. What is the interest of 225*l.* 10*s.* for 23 days at $4\frac{1}{2}$ per cent. per annum?

princ.	rate	days	l.	s.	d.	q.
225.5	4.5	23	0	10	11	2.03
			30	0	1	7.90
			3	0	0	1.89
			0.3	0	0	0.79
			0.09	0	0	0.24
<hr/>						
100)	23339.25		Anf.	0	12	9.185 true
	233.5925					in the last place of decimals.

Another ingenious and general method of computing Interest, is by the following small but comprehensive Table:

A General Interest Table																				
By which the Interest of any Sum, at any Rate, and for any Time, may be readily found.																				
Days.	1 perCent.				3 $\frac{1}{2}$ perCent.				4 per Cent.				4 $\frac{1}{2}$ perCent.				5 perCent.			
	l.	s.	d.	q.	l.	s.	d.	q.	l.	s.	d.	q.	l.	s.	d.	q.	l.	s.	d.	q.
1																				
2																				
3																				
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70																				
80																				
90																				
100																				
200																				
300																				

N. B. This Table contains the interest of 100*l.* for all the several days in the first column, and at the several rates of $3\frac{1}{2}$, 4, $4\frac{1}{2}$, and 5 per cent. in the other 5 columns.

To find the Interest of 100*l.* for any other time, as 1 year and 278 days, at $4\frac{1}{2}$ per cent. Take the sums for the several days as here below.

The Int. for 1 year	4	10	0	0
Against 200 ds. is	2	9	3	3
70 ds. -	0	17	3	1
8 ds. -	0	1	11	0
<hr/>				
Interest required	7	18	6	0

For any other sum than 100*l.* First find for 100*l.* as above, and take it so many times or parts as the sum is of 100*l.* Thus to find for 355*l.* at $4\frac{1}{2}$, for 1 year and 278 days.

First, 3 times the above sum,	
(for 300 <i>l.</i>) is -	23 15 8 1
$\frac{1}{2}$ (for 50 <i>l.</i>) is -	3 19 3 1
$\frac{1}{10}$ of this (for 5 <i>l.</i>) is -	0 7 11 0

So for 355 it is - 28 2 10 2

When the interest is required for any other rate than those in the table, it may be easily made out from them. So $\frac{1}{2}$ of 5 is $2\frac{1}{2}$, $\frac{1}{2}$ of 4 is 2, $\frac{1}{2}$ of 3 is $1\frac{1}{2}$, $\frac{1}{3}$ of 3 is 1, 1-6th of 3 is $\frac{1}{2}$, and 1-12th of 3 is $\frac{1}{4}$. And so, by parts, or by adding or subtracting, any rate may be made out.

Compound INTEREST, called also *Interest-upon-Interest*, is that which is counted not only upon the principal sum lent, but also for its interest, as it becomes due, at the end of each stated time of payment.

Although it be not lawful to lend money at compound interest, yet in purchasing annuities, pensions, &c. and taking leases in reversion, it is usual to allow compound interest to the purchaser for his ready money; and therefore it is very necessary to understand this subject.

Besides the quantities concerned in simple interest, viz. the principal *p*, the rate or interest of 1*l.* for 1 year *r*, the amount *a*, and the time *t*, there is another quantity employed in com-

ound interest, viz. the ratio of the rate of interest, which is the amount of 1*l.* for 1 time of payment, and which here let be denoted by *R*, viz. $R = 1 + r$. Then, the particular amounts for the several times may be thus computed, viz. As 1 pound is to its amount for any time, so is any proposed principal sum to its amount for the same time; i. e.

1*l.* : *R* :: *p* : *pR* the 1st year's amount,
 1*l.* : *R* :: *pR* : *pR*² the 2d year's amount,
 1*l.* : *R* :: *pR*² : *pR*³ the 3d year's amount,
 and so on.

Therefore, in general, $pR^t = a$ is the amount for the *t* year, or *t* time of payment. From whence the following general theorems are deduced :

1st, $a = pR^t$ the amount,

2d, $p = \frac{a}{R^t}$ the principal,

3d, $R = \sqrt[t]{\frac{a}{p}}$ the ratio,

4th, $t = \frac{\log. \text{ of } a - \log. \text{ of } p}{\log. \text{ of } R}$ the time.

From which any one of the quantities may be found, when the rest are given.

For example, suppose it were required to find in how many years any principal sum will double itself, at any rate of interest. In this case we must employ the 4th theorem, where *a* will be = 2*p*, and then it

$$\text{is } t = \frac{1. a - 1. p}{\log. R} = \frac{1. 2p - 1. p}{\log. R} = \frac{\log. 2}{\log. R}$$

So, if the rate of interest be 5 per cent. per annum; then $R = 1 + .05 = 1.05$, and hence

$$t = \frac{\log. 2}{\log. 1.05} = \frac{.3010300}{.0211893} = 14.2067 \text{ nearly; that is, any}$$

sum doubles in $14\frac{1}{5}$ years nearly, at the rate of 5 per cent. per annum compound interest.

Hence, and from the like question in simple interest, above given, are deduced the times in which any sum doubles itself, at several rates of interest, both simple and compound: viz.

At	At Sim. Int. Years.	At Comp. Int. Years.
2	50	35.0028
$2\frac{1}{2}$	40	28.0701
3	$33\frac{1}{3}$	23.4498
$3\frac{1}{2}$	$28\frac{2}{7}$	20.1488
4	25	17.6730
$4\frac{1}{2}$	$22\frac{2}{9}$	15.7473
5	20	14.2067
6	$16\frac{2}{3}$	11.8957
7	$14\frac{2}{7}$	10.2448
8	$12\frac{1}{2}$	9.0065
9	$11\frac{1}{9}$	8.0432
10	10	7.2725

The following Table will facilitate the calculation of compound interest for any sum, and any number of years, at various rates of interest.

The Amount of 1*l.* in any Number of Years.

Yrs.	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	6
1	1.0300	1.0350	1.0400	1.0450	1.0500	1.0600
2	1.0609	1.0712	1.0816	1.0920	1.1025	1.1236
3	1.0927	1.1087	1.1249	1.1412	1.1576	1.1910
4	1.1255	1.1475	1.1699	1.1925	1.2155	1.2625
5	1.1593	1.1877	1.2167	1.2462	1.2763	1.3382
6	1.1941	1.2293	1.2653	1.3023	1.3401	1.4185
7	1.2299	1.2723	1.3159	1.3609	1.4071	1.5036
8	1.2668	1.3168	1.3686	1.4221	1.4775	1.5939
9	1.3048	1.3629	1.4233	1.4861	1.5513	1.6895
10	1.3439	1.4106	1.4802	1.5530	1.6289	1.7909
11	1.3842	1.4600	1.5395	1.6229	1.7103	1.8983
12	1.4258	1.5111	1.6010	1.6959	1.7959	2.0122
13	1.4685	1.5640	1.6651	1.7722	1.8856	2.1329
14	1.5126	1.6187	1.7317	1.8519	1.9799	2.2609
15	1.5580	1.6753	1.8009	1.9353	2.0789	2.3966
16	1.6047	1.7340	1.8730	2.0224	2.1829	2.5404
17	1.6528	1.7947	1.9479	2.1134	2.2920	2.6928
18	1.7024	1.8575	2.0258	2.2085	2.4066	2.8543
19	1.7535	1.9225	2.1068	2.3079	2.5270	3.0256
20	1.8061	1.9898	2.1911	2.4117	2.6533	3.2071

The use of this table, which contains all the powers R^t , to the 20th power, or the amounts of 1*l.* is chiefly to calculate the interest, or the amount, of any principal sum, for any time, not more than 20 years. For example, required to find to how much 523*l.* will amount in 13 years, at the rate of 5*l.* per cent. per annum compound interest.

In the table, on the line 13 and column 5 per cent. is the amount of 1*l.* viz. 1.8856, this multiplied by the principal 523,

gives the amount 1087.2647
 or 1087*l.* 5*s.* $3\frac{1}{4}$ *d.*
 and therefore the interest is 564*l.* 5*s.* $3\frac{1}{4}$ *d.*

See ANNUITIES; DISCOUNT; REVERSION; Smart's Tables of Interest; the Philos. Transf. vol. vi. p. 508; and ARITHMETIC.

INTERJECTION, in grammar, an indeclinable part of speech, signifying some passion or emotion of the mind. See GRAMMAR.

INTERIM, a name given to a formulary, or kind of confession of the articles of faith, obtruded upon the Protestants after Luther's death by the emperor Charles V. when he had defeated their forces; so called because it was only to take place in the *interim* (mean time) till a general council should have decided all points in dispute between the Protestants and Romanists. It retained most of the doctrines and ceremonies of the Romanists, excepting that of marriage, which was allowed to the clergy, and communion to the laity under both kinds. Most of the Protestants rejected it. There were two other interims; one of Leipzig, the other of Franconia.

INTERLOCUTORY Decree, in law. In a suit in equity, if any matter of fact be strongly controverted, the fact is usually directed to be tried at the bar of the court of king's bench, or at the assizes, upon a feigned issue. If a question of mere law arises in the course of a cause, it is the practice of the court of chancery to refer it to the opinion of the judges of the court of king's bench, upon a case stated for that purpose. In such cases interlocutory decrees or orders are made.

INTERLOCUTORY Judgments are such as are given in the middle of a cause, upon some plea, proceeding on default,

which is only intermediate, and does not finally determine or complete the suit. But the interlocutory judgments most usually spoken of, are those incomplete judgments, whereby the right of the plaintiff is established, but the *quantum* of damages sustained by him is not ascertained, which is the province of a jury. In such a case a writ of inquiry issues to the sheriff, who summons a jury, inquires of the damages, and returns to the court the inquisition so taken; whereupon the plaintiff's attorney taxes costs, and signs final judgment.

INTERLOCUTORY Order, that which decides not the cause, but only settles some intervening matter relating to the cause. As where an order is made in chancery, for the plaintiff to have an injunction, to quit possession till the hearing of the cause; this order, not being *final*, is called *interlocutory*.

INTERLOPERS, are properly those who, without due authority, hinder the trade of a company or corporation lawfully established, by dealing in the same way.

INTERLUDE, an entertainment exhibited on the theatre between the acts of a play, to amuse the spectators while the actors take breath and shift their dress, or to give time for changing the scenes and decorations. In the ancient tragedy, the chorus sang the interludes, to show the intervals between the acts. Interludes, among us, usually consist of songs, dances, feats of activity, concerts of music, &c. Aristotle and Horace give it for a rule, that the interludes should consist of songs built on the principal parts of the drama; but since the chorus has been laid down, dancers, buffoons, &c. ordinarily furnish the interludes.

INTERMENT, the act of interring, *i. e.* burying or laying a deceased person in the ground. Aristotle asserted, that it was more just to assist the dead than the living. Plato, in his Republic, does not forget, amongst other parts of justice, that which concerns the dead. Cicero establishes three kinds of justice: the first respects the gods, the second the manes or dead, and the third men. These principles seem to be drawn from nature; and they appear at least to be necessary for the support of society, since at all times civilized nations have taken care to bury their dead, and to pay their last respects to them. See **BURIAL**.

We find in history several traces of the respect which the Indians, the Egyptians, and the Syrians entertained for the dead. The Syrians embalmed their bodies with myrrh, aloes, honey, salt, wax, bitumen, and resinous gums; they dried them also with the smoke of the fir and the pine tree. The Egyptians preserved theirs with the resin of the cedar, with aromatic spices, and with salt. These people often kept such mummies, or at least their effigies, in their houses; and at grand entertainments they were introduced, that by reciting the great actions of their ancestors they might be better excited to virtue. See **FUNERAL Rites**.

The Greeks, at first, had probably not the same veneration for the dead as the Egyptians. Empedocles, therefore, in the eighty-fourth Olympiad, restored to life Ponthia, a woman of Agrigentum, who was about to be interred. See *Diogenes Laertius de Vita et Moribus Philosophorum*, lib. 8. But this people, in proportion as they grew civilized, becoming more enlightened, perceived the necessity of establishing laws for the protection of the dead.

At Athens the law required that no person should be interred before the third day; and in the greater part of the cities of Greece a funeral did not take place till the sixth or seventh. When a man appeared to have breathed his last, his body was generally washed by his nearest relations, with warm water mixed with wine. They afterwards anointed it with oil; and covered it with a dress commonly made of fine linen, according to the custom of the Egyptians. This dress was white at Messina, Athens, and in the greater part of the

cities of Greece, where the dead body was crowned with flowers. At Sparta it was of a purple colour, and the body was surrounded with olive leaves. The body was afterwards laid upon a couch in the entry of the house, where it remained till the time of the funeral. At the magnificent obsequies with which Alexander honoured Iphesstion, the body was not burned until the tenth day.

The Romans, in the infancy of their empire, paid as little attention to their dead as the Greeks had done. Acilius Aviola, having fallen into a lethargic fit, was supposed to be dead; he was therefore carried to the funeral pile; the fire was lighted up; and though he cried out he was still alive, he perished for want of speedy assistance. The Prætor Læmia met with the same fate. Tubero, who had been Prætor, was saved from the funeral pile. Asclepiades a physician, who lived in the time of Pompey the Great, about one hundred and twenty years before the Christian æra, returning from his country-house, observed near the walls of Rome a grand convoy and a crowd of people, who were in mourning, assisting at a funeral, and showing every exterior sign of the deepest grief. Having asked what was the occasion of this intercourse, no one made any reply. He therefore approached the pretended dead body; and imagining that he perceived signs of life in it, he ordered the by-standers to take away the flambeaux, to extinguish the fire, and to pull down the funeral pile. A kind of murmur on this arose throughout the whole company. Some said that they ought to believe the physician, while others turned both him and his profession into ridicule. The relations, however, yielded at length to the remonstrances of Asclepiades; they consented to defer the obsequies for a little; and the consequence was, the restoration of the pretended dead person to life. It appears that these examples, and several others of the like nature, induced the Romans to delay funerals longer, and to enact laws to prevent precipitate interments.

At Rome, after allowing a sufficient time for mourning, the nearest relation generally closed the eyes of the deceased; and the body was bathed with warm water, either to render it fitter for being anointed with oil, or to reanimate the principle of life, which might remain suspended without manifesting itself. Proofs were afterwards made, to discover whether the person was really dead, which were often repeated during the time that the body remained exposed; for there were persons appointed to visit the dead, and to prove their situation. On the second day, after the body had been washed a second time, it was anointed with oil and balm. Luxury increased to such a pitch in the choice of foreign perfumes for this purpose, that under the consulship of Licinius Crassus and Julius Cæsar, the senate forbade any perfumes to be used except such as were the production of Italy. On the third day the body was clothed according to its dignity and condition. The robe called the prætexta was put upon magistrates, and a purple robe upon consuls: for conquerors, who had merited triumphal honours; this robe was of gold tissue. For other Romans it was white, and black for the lower classes of the people. These dresses were often prepared at a distance, by the mothers and wives of persons still in life. On the fourth day the body was placed on a couch, and exposed in the vestibule of the house, with the visage turned towards the entrance, and the feet near the door: in this situation it remained till the end of the week. Near the couch were lighted wax-tapers, a small box in which perfumes were burnt, and a vessel full of water for purification, with which those who approached the body besprinkled themselves. An old man, belonging to those who furnished every thing necessary for funerals, sat near the deceased, with some domestics clothed in black. On the eighth day the funeral rites were performed; but to prevent the body from corrupting before that time, salt, wax, the resinous gum of the cedar,

myrrh, honey, balm, gypsum, lime, asphalt, or bitumen of Judea, and several other substances, were employed. The body was carried to the pile with the face uncovered, unless wounds or the nature of the disease had rendered it loathsome and disgusting. In such a case a mask was used, made of a kind of plaster; which has given rise to the expression of *funera larvata*, used in some of the ancient authors. This was the last method of concealment which Nero made use of, after having caused Germanicus to be poisoned: for the effect of the poison had become very sensible by livid spots and the blackness of the body; but a shower of rain happening to fall, it washed the plaster entirely away, and thus the horrid crime of fratricide was discovered.

The Turks have, at all times, been accustomed to wash the bodies of their dead before interment; and as their ablutions are complete, and no part of the body escapes the attention of those who assist at such melancholy ceremonies, they can easily perceive whether one be really dead or alive, by examining, among other methods of proof, whether the *sphincter ani* has lost its power of contraction. If this muscle remains still contracted, they warm the body, and endeavour to recall it to life; otherwise, after having washed it with water and soap, they wipe it with linen cloths, wash it again with rose water and aromatic substances, cover it with a rich dress, put upon its head a cap ornamented with flowers, and extend it upon a carpet placed in the vestibule or hall at the entrance of the house.

In the primitive church the dead were washed and then anointed; the body was wrapped up in linen, or clothed in a dress of more or less value according to circumstances, and it was not interred until after being exposed and kept some days in the house. The custom of clothing the dead was usual in France only for princes and ecclesiastics.

In other countries, more or less care is taken to prevent sudden interments. At Geneva, there are people appointed to inspect all dead bodies. Their duty consists in examining whether the person be really dead, and whether one died naturally or by violence. In the north, as well as at Genoa, it is usual not to bury the dead till three days have expired. In Holland, people carry their precautions much farther, and delay the funerals longer. And in England bodies generally remain unburied three or four days.

Premature INTERMENT. Notwithstanding the customs above recited; still, in many places, and on many occasions in all places, too much precipitation attends this last office; or, if not precipitation, a neglect of due precautions in regard to the body. In general, indeed, the most improper treatment that can be imagined is adopted, and many a person made to descend into the grave before he has sighed his last breath. The histories related by Hildanus, by Camerarius, by Horstius, by Macrobius in his *Somnium Scipionis*, by Plato in his *Republic*, by Valerius Maximus, and by a great many modern authors, leave us no doubt respecting the dangers or misconduct of such precipitation. It must appear astonishing that the attention of mankind has been after all so little roused by an idea the most terrible that can be conceived on this side of eternity. According to present usage, as soon as the semblance of death appears, the chamber of the sick is deserted by friends, relatives, and physicians; and the apparently dead, though frequently living, body is committed to the management of an ignorant and unfeeling nurse, whose care extends no farther than laying the limbs straight, and securing her accustomed perquisites. The bed-clothes are immediately removed, and the body is exposed to the air. This, when cold, must extinguish any spark of life that may remain, and which, by a different treatment, might have been kindled into flame; or it may only continue to reproach it, and the unhappy person afterwards revive amidst the horrors of the tomb.

The difference between the end of a weak life and the commencement of death, is so small, and the uncertainty of the signs of the latter is so well established both by ancient and modern authors who have turned their attention to that important object, that we can scarcely suppose undertakers capable of distinguishing an apparent from a real death. Animals which sleep during winter show no signs of life; in this case, circulation is only suspended: but, were it annihilated, the vital spirit does not so easily lose its action as the other fluids of the body; and the principle of life, which long survives the appearance of death, may re-animate a body in which the action of all the organs seems to be at an end. But how difficult is it to determine whether this principle may not be revived! It has been found impossible to recall to life some animals suffocated by mephitic vapours, though they appeared less affected than others who have revived. Coldness, heaviness of the body, a leaden livid colour, with a yellowness in the visage, are all very uncertain signs: Mr. Zimmerman observed them all upon the body of a criminal, who fainted through the dread of that punishment which he had merited. He was shaken, dragged about, and turned in the same manner as dead bodies are, without the least signs of resistance; and yet at the end of 24 hours he was recalled to life by means of volatile alkali.

A director of the coach-office at Dijon, named *Colinet*, was supposed to be dead, and the news of this event was spread throughout the whole city. One of his friends, who was desirous of seeing him at the moment when he was about to be buried, having looked at him for a considerable time, thought he perceived some remains of sensibility in the muscles of the face. He therefore made an attempt to bring him to life by spirituous liquors, in which he succeeded; and this director enjoyed afterwards for a long time that life which he owed to his friend. This remarkable circumstance was much like those of Empedocles and Asclepiades. These instances would perhaps be more frequent, were men of skill and abilities called in cases of sudden death, in which people of ordinary knowledge are often deceived by false appearances.

A man may fall into a syncope, and may remain in that condition three or even eight days. People in this situation have been known to come to life when deposited among the dead. A boy belonging to the hospital at Cassel appeared to have breathed his last: he was carried into the hall where the dead were exposed, and was wrapped up in a piece of canvas. Some time after, recovering from his lethargy, he recollected the place in which he had been deposited, and crawling towards the door knocked against it with his foot. This noise was luckily heard by the sentinel, who soon perceiving the motion of the canvas called for assistance. The youth was immediately conveyed to a warm bed, and soon perfectly recovered. Had his body been confined by close bandages or ligatures, he would not have been able, in all probability, to make himself heard: his unavailing efforts would have made him again fall into a syncope, and he would have been thus buried alive.

We must not be astonished that the servants of an hospital should take a syncope for a real death, since even the most enlightened people have fallen into errors of the same kind. Dr. John Schmid relates, that a young girl, seven years of age, after being afflicted for some weeks with a violent cough, was all of a sudden freed from this troublesome malady, and appeared to be in perfect health. But some days after, while playing with her companions, this child fell down in an instant as if struck by lightning. A death-like paleness was diffused over her face and arms; she had no apparent pulse, her temples were sunk, and she showed no signs of sensation when shaken or pinched. A physician, who was called, and who believed her to be dead, in compliance with the repeated and press-

ing request of her parents, attempted, though without any hopes, to recall her to life; and at length, after several vain efforts, he made the soles of her feet be smartly rubbed with a brush dipped in strong pickle. At the end of three quarters of an hour she was observed to sigh; she was then made to swallow some spirituous liquor; and she was soon after restored to life, much to the joy of her disconsolate parents.—A certain man having undertaken a journey, in order to see his brother, on his arrival at his house found him dead. This news affected him so much, that it brought on a most dreadful syncope, and he himself was supposed to be in the like situation. After the usual means had been employed to recall him to life, it was agreed that his body should be dissected, to discover the cause of so sudden a death; but the supposed dead person overhearing this proposal opened his eyes, started up, and immediately betook himself to his heels.—Cardinal Elpinola, prime minister to Philip II. was not so fortunate; for we read in the *Memoirs of Amelot de la Houssai*, that he put his hand to the knife with which he was opened in order to be embalmed. In short, almost every one knows that Vesalius, the father of anatomy, having been sent for to open a woman subject to hysterics, who was supposed to be dead, he perceived, on making the first incision, by her motion and cries, that she was still alive; that this circumstance rendered him so odious, that he was obliged to fly; and that he was so much affected by it, that he died soon after.—On this occasion, we cannot forbear to add an event more recent, but no less melancholy. The Abbé Prevost, so well known by his writings and the singularities of his life, was seized with a fit of the apoplexy, in the forest of Chantilly, on the 23d of October 1763. His body was carried to the nearest village, and the officers of justice were proceeding to open it, when a cry which he sent forth affrightened all the assistants, and convinced the surgeon that the Abbé was not dead; but it was too late to save him, as he had already received the mortal wound.

Even in old age, when life seems to have been gradually drawing to a close, the appearances of death are often fallacious. The following instance is recorded in the *London Chronicle*, vol. iv. p. 456. A lady in Cornwall, more than 80 years of age, who had been a considerable time declining, took to her bed, and in a few days seemingly expired in the morning. As she had often desired not to be buried till she had been two days dead, her request was to have been regularly complied with by her relations. All that saw her looked upon her as dead, and the report was current through the whole place; nay, a gentleman of the town actually wrote to his friend in the island of Scilly that she was deceased. But one of those who were paying the last kind office of humanity to her remains, perceived some warmth about the middle of the back; and acquainting her friends with it, they applied a mirror to her mouth, but, after repeated trials, could not observe it in the least stained; her under jaw was likewise fallen, as the common phrase is; and, in short, she had every appearance of a dead person. All this time she had not been stripped or dressed; but the windows were opened, as is usual in the chambers of the deceased. In the evening the heat seemed to increase, and at length she was perceived to breathe.

In short, not only the ordinary signs are very uncertain, but we may say the same of the stiffness of the limbs, which may be convulsive; of the dilatation of the pupil of the eye, which may proceed from the same cause; of putrefaction, which may equally attack some parts of a living body; and of several others. Haller, convinced of the uncertainty of all these signs, proposes a new one, which he considers as infallible. “If the person (says he) be still in life, the mouth will immediately shut of itself, because the contraction of the muscles of the jaw will awaken their irritability.” The jaw, however, may

be deprived of its irritability though a man may not be dead. Life is preserved a long time in the passage of the intestines. The sign pointed out by Dr. Fothergill appears to deserve more attention. “If the air blown into the mouth (says this physician) passes freely through all the alimentary channels, it affords a strong presumption that the irritability of the internal sphincters is destroyed, and consequently that life is at an end.” These signs, which deserve to be confirmed by new experiments, are doubtless not known to undertakers.

The difficulty of distinguishing a person apparently dead from one who is really so, has, in all countries where bodies have been interred too precipitately, rendered it necessary for the law to assist humanity. Of several regulations made on this subject, we shall quote only a few of the most recent; such as those of Arras in 1772; of Mantua in 1774; of the Grand Duke of Tuscany in 1775; of the Senechaussée of Sivrai, in Poitou, in 1777; and of the Parliament of Metz in the same year. To give an idea of the rest, it will be sufficient to relate only that of Tuscany. By this edict, the Grand Duke forbids the precipitate interment of persons who die suddenly. He orders the Magistrates of Health to be informed, that physicians and surgeons may examine the body; that they may use every endeavour to recall it to life, if possible, or to discover the cause of its death; and that they shall make a report of their procedure to a certain tribunal. On this occasion, the Magistrate of Health orders the dead not to be covered until the moment they are about to be buried, except so far as decency requires; observing always that the body be not closely confined, and that nothing may compress the jugular veins and the carotid arteries. He forbids people to be interred according to the ancient method; and requires that the arms and the hands should be left extended, and that they should not be folded or placed cross-wise upon the breast. He forbids, above all, to press the jaws one against the other; or to fill the mouth and nostrils with cotton, or other stuffing. Lastly, he recommends not to cover the visage with any kind of cloth until the body is deposited in its coffin.

We shall conclude this article by subjoining, from the publications of the Humane Society in London, a few of the cases in which this fallacious appearance of death is most likely to happen, together with the respective modes of treatment which he recommends.

In apoplectic and fainting fits, and in those arising from any violent agitation of mind, and also when opium or spirituous liquors have been taken in too great a quantity, there is reason to believe that the appearance of death has been frequently mistaken for the reality. In these cases, the means recommended by the Society should be persevered in for several hours; and bleeding, which in similar circumstances has sometimes proved pernicious, should be used with great caution. See the article *DROWNING*. In the two latter instances it will be highly expedient, with a view of counteracting the soporific effects of opium and spirits, to convey into the stomach, by a proper tube, a solution of tartar emetic, and by various other means to excite vomiting.

From the number of children carried off by convulsions, and the certainty arising from undoubted facts, that some who have in appearance died from that cause have been recovered; there is the greatest reason for concluding, that many, in consequence of this disease, have been prematurely numbered among the dead; and that the fond parent, by neglecting the means of recalling life, has often been the guiltless executioner of her own offspring. To prevent the commission of such dreadful mistakes, no child, whose life has been apparently extinguished by convulsions, should be consigned to the grave till the means of recovery above recommended in apoplexies, &c. have been tried; and, if possible, under the direction of some skilful prac-

tionner of medicine, who may vary them as circumstances shall require.

When fevers arise in weak habits, or when the cure of them has been principally attempted by means of depletion, the consequent debility is often very great, and the patient sometimes sinks into a state which bears so close an affinity to that of death, that there is reason to suspect it has too often deceived the by-standers, and induced them to send for the undertaker when they should have had recourse to the succours of medicine. In such cases, volatiles, hartshorn for example, should be applied to the nose, rubbed on the temples, and sprinkled often about the bed; hot flannels, moistened with a strong solution of camphorated spirit, may likewise be applied over the breast, and renewed every quarter of an hour; and as soon as the patient is able to swallow, a tea-spoonful of the strongest cordial should be given every five minutes.

The same methods may also be used with propriety in the small-pox when the pustules sink, and death apparently ensues; and likewise in any other acute diseases, when the vital functions are suspended from a similar cause.

INTERMITTENT, or INTERMITTING, Fevers. Such fevers as go off and soon return again, in opposition to those which are continual. See **MEDICINE**.

INTERPOLATION, among critics, denotes a spurious passage inserted into the writings of some ancient author.

INTERPOLATION, in the modern Algebra, is used for finding an intermediate term of a series, its place in the series being given.

The method of interpolation was first invented by Mr. Briggs, and applied by him to the calculation of logarithms, &c. in his *Arithmetica Logarithmica*, and his *Trigonometria Britannica*; where he explains, and fully applies the method of interpolation by differences. His principles were followed by Reginald and Mouton in France, and by Cotes and others in England. Wallis made use of the method of interpolation in various parts of his works; as his arithmetic of infinites, and his algebra, for quadratures, &c. The same was also happily applied by Newton in various ways: by it he investigated his binomial theorem, and quadratures of the circle, ellipse, and hyperbola: see Wallis's *Algebra*, chap. 85, &c. Newton also, in lemma 5, lib. 3 *Princip.* gave a most elegant solution of the problem for drawing a curve line through the extremities of any number of given ordinates; and in the subsequent proposition, applied the solution of this problem to that of finding from certain observed places of a comet, its place at any given intermediate time. And Dr. Waring, who adds, that a solution still more elegant, on some accounts, has been since discovered by Mess. Nichol and Stirling, has also resolved the same problem, and rendered it more general, without having recourse to finding the successive differences. *Philos. Trans.* vol. 69, part 1, art. 7.

Mr. Stirling indeed pursued this branch as a distinct science, in a separate treatise, viz. *Traçtatus de Summatione et Interpolatione Serierum Infinitarum*, in the year 1730.

When the 1st, 2d, or other successive differences of the terms of a series become at last equal, the interpolation of any term of such a series may be found by Newton's differential method.

When the algebraic equation of a series is given, the term required, whether it be a primary or intermediate one, may be found by the resolution of affected equations; but when that equation is not given, as it often happens, the value of the term sought must be exhibited by a converging series, or by the quadrature of curves. See Stirling, *ut supra*, p. 86. Meyer, in *Act. Petr.* tom. 2, p. 180.

A general theorem for interpolating any term is as follows: Let A denote any term of an equidistant series of terms, and a, b, c , &c. the first of the 1st, 2d, 3d, &c. orders of differences:

then the term z , whose distance from A is expressed by x , will be this, viz. *Theorem 1*,

$$z = A + xa + x \cdot \frac{x-1}{2} b + x \cdot \frac{x-1}{2} \cdot \frac{x-2}{3} c \&c.$$

Hence, if any of the orders of differences become equal to one another, or $= 0$, this series for the interpolated term will break off, and terminate, otherwise it will run out in an infinite series.

Ex. To find the 20th term of the series of cubes 1, 8, 27, 64, 125, &c. or $1^3, 2^3, 3^3, 4^3, 5^3$, &c.

Set down the series in a column, and take their continual differences as here annexed, where the 4th differences, and all after it become $= 0$, also $A = 1$, $a = 7$, $b = 12$, $c = 6$, and $x = 19$; therefore the 20th term sought is barely

$$z = 1 + 19 \times 7 + 19 \times \frac{18}{2} \times 12 + 19 \cdot \frac{18}{2} \cdot \frac{17}{3} \cdot 6 \\ = 1 + 133 + 2052 + 5814 = 8000.$$

Theor. 2. In any series of equidistant terms, a, b, c, d , &c. whose first differences are small; to find any term wanting in that series, having any number of terms given. Take the equation which stands against the number of given terms, in the following table; and by reducing the equation, that term will be found.

No. Equations.

$$\begin{array}{l} 1 \quad a - b = 0 \\ 2 \quad a - 2b + c = 0 \\ 3 \quad a - 3b + 3c - d = 0 \\ 4 \quad a - 4b + 6c - 4d + e = 0 \\ 5 \quad a - 5b + 10c - 10d + 5e - f = 0 \\ 6 \quad a - 6b + 15c - 20d + 15e - 6f + g = 0 \\ \&c. \quad \&c. \end{array}$$

$$n \quad a - nb + n \cdot \frac{n-1}{2} c - n \cdot \frac{n-1}{2} \cdot \frac{n-2}{3} d \&c. = 0.$$

where it is evident that the coefficients in any equation, are the unciæ of a binomial $1 + 1$ raised to the power denoted by the number of the equation.

Ex. Given the logarithms of 101, 102, 104, and 105; to find the log. of 103.

Here are 4 quantities given; therefore we must take the 4th equation $a - 4b + 6c - 4d + e = 0$, in which it is the middle quantity or term c that is to be found, because 103 is in the middle among the numbers 101, 102, 104, 105; then that equation gives the value of c as follows, viz.

$$c = \frac{4 \cdot b + d - a + e}{6}.$$

Now the logs. of the given numbers will be thus:

$$\begin{array}{l} 2.0043214 = a \\ 2.0086002 = b \\ 2.0170333 = d \\ 2.0211893 = e \end{array}$$

$$4.0256335 = b + d$$

$$16.1025340 = 4 \cdot b + d$$

$$\text{subtr. } 4.0256335 = a + e$$

$$6) 12.0770233 \\ 2.0128572 \quad \text{the log. of } 103.$$

Theor. 3. When the terms $a, b, c, d, \&c.$ are at unequal distances from each other; to find any intermediate one of these terms, the rest being given.

Let $p, q, r, s, \&c.$ be the several distances of those terms from each other; then let

$$B = \frac{b-a}{p}, C = \frac{B_1-B}{p+q}, D = \frac{C_1-C}{p+q+r}, E = \frac{D_1-D}{p+q+r+s}.$$

$$B_1 = \frac{c-b}{q}, C_1 = \frac{B_2-B_1}{q+r}, D_1 = \frac{C_2-C_1}{q+r+s},$$

$$B_2 = \frac{d-c}{r}, C_2 = \frac{B_3-B_2}{r+s},$$

$$B_3 = \frac{e-d}{s},$$

$\&c. \quad \&c. \quad \&c.$

Then the term x , whose distance from the beginning is x , will be

$$x = a + Bx + \frac{Cx \cdot x - p + Dx \cdot x - p \cdot x - p - q}{+ Ex \cdot x - p \cdot x - p - q \cdot x - p - q - r + \&c};$$

to be continued to as many terms as there are terms in the given series. By this series may be found the place of a comet, or the sun, or any other object at a given time; by knowing the places of the same for several other given times. Other methods of interpolation may be found in the *Philos. Trans.* number 362; or Stirling's Summation and Interpolation of Series.

INTERPOSITION, the situation of a body between two others, so as to hide them, or prevent their action. The eclipse of the sun is occasioned by an interposition of the moon between the sun and us; and that of the moon by the interposition of the earth between the sun and moon. See **ECLIPSE**.

INTERPRETER, a person who explains the thoughts, words, or writings, of some other, which before were unintelligible. The word *interpretes*, according to Isidore, is composed of the preposition *inter*, and *partes*, as signifying a person in the middle betwixt two parties, to make them mutually understand each others thoughts: others derive it from *inter*, and *præs*, i. e. *fidejussor*; q. d. a person who serves as security between two others who do not understand one another. There have been great debates about interpreting Scripture. The Romanists contend, that it belongs absolutely to the church; adding, that where she is silent, reason may be consulted; but where she speaks, reason is to be disregarded. The Protestants generally allow Reason the sovereign judge, or interpreter; though some among them have a strong regard to synods, and others to the authority of the primitive fathers. Lastly, others have recourse to the spirit within every person to interpret for them; which is what Bochart calls *ἀποδείξις τῆς πνευματικῆς*.

INTERREGNUM, the time during which the throne is vacant in elective kingdoms; for in such as are hereditary, like ours, there is no such thing as an interregnum.

INTERREX, the magistrate who governs during an interregnum. This magistrate was established in old Rome, and was almost as ancient as the city itself: after the death of Romulus there was an interregnum of a year, during which the senators were each interrex in their turn, five days a-piece. After the establishment of consuls and a commonwealth, though there were no kings, yet the name and function of *interrex* was still preserved: for, when the magistrates were absent, or there was any irregularity in their election, or they had abdicated, so that the comitia could not be held; provided they were unwilling to create a dictator, they made an interrex, whose office and authority was to last five days; after which they made another. To the interrex was delegated all the regal and consular authority, and he performed all their func-

tions. He assembled the senate, held comitia or courts, and took care that the election of magistrates was according to rules. Indeed at first it was not the custom of the interrex to hold comitia, at least we have no instance of it in the Roman history. The patricians alone had the right of electing an interrex; but this office fell with the republic, when the emperors made themselves masters of every thing.

INTERROGATION, *EROTESIS*, a figure of rhetoric, in which the passion of the speaker introduces a thing by way of question, to make its truth more conspicuous. The interrogation is a kind of apostrophe which the speaker makes to himself; and it must be owned, that this figure is suited to express most passions and emotions of the mind; it serves also to press and bear down an adversary, and generally adds an uncommon briskness, action, force, and variety, to discourse.

INTERROGATION, in grammar, is a point which serves to distinguish such parts of a discourse where the author speaks as if he were asking questions. Its form is this (?).

INTERROGATORIES, in law, are particular questions demanded of witnesses brought in to be examined in a cause, especially in the court of chancery. And these interrogatories must be exhibited by the parties in suit on each side; which are either direct for the party that produces them, or counter, on behalf of the adverse party; and generally both plaintiff and defendant may exhibit direct, and counter, or cross interrogatories. They are to be pertinent, and only to the points necessary; and either drawn or perused by counsel, and to be signed by them.

INTERSCENDENT, in Algebra, is applied to quantities, when the exponents of their powers are radical quantities.

Thus $x^{\sqrt{2}}$, $x^{\sqrt{a}}$, &c. are interscendent qualities. See **FUNCTION**.

INTERSECTION, in mathematics, the cutting of one line, or plane, by another; or the point or line wherein two lines, or two planes, cut each other. The mutual intersection of two planes is a right line. The centre of a circle is in the intersection of two diameters. The central point of a regular or irregular figure of four sides, is the point of intersection of the two diagonals. The equinoxes happen when the sun is in the intersections of the equator and ecliptic.

INTERSPINALES. See **ANATOMY**, *Table of the Muscles*.

INTERSTELLAR, a word used by some authors to express those parts of the universe that are without and beyond the limits of our solar system. In the Interstellar regions, it is supposed there are several other systems of planets moving round the fixed stars, as the centres of their respective motions. And if it be true, as it is not improbable, that each fixed star is thus a sun to some habitable orbs, or earths, that move round it, the Interstellar world will be infinitely the greatest part of the universe.

INTERVAL, the distance or space between two extremes, either in time or place. The word comes from the Latin *intervallum*, which, according to Isidore, signifies the space *inter fossam & murum*, "between the ditch and the wall;" others note, that the stakes or piles, driven into the ground in the ancient Roman bulwarks, were called *valla*; and the interstices or vacancy between them *intervalla*.

INTERVAL, in music. The distance between any given sound and another, strictly speaking, is neither measured by any common standard of extension or duration; but either by immediate sensation, or by computing the difference between the numbers of vibrations produced by two or more sonorous bodies, in the act of sounding, during the same given time. As the vibrations are slower and fewer during the same instant, for example, the sound is proportionally lower or

graver; on the contrary, as during the same period the vibrations increase in number and velocity, the sounds are proportionably higher or more acute. An interval in music, therefore, is properly the difference between the number of vibrations produced by one sonorous body of a certain magnitude and texture, and of those produced by another of a different magnitude and texture in the same time.

Intervals are divided into consonant and dissonant. A consonant interval is that whose extremes, or whose highest and lowest sounds, when simultaneously heard, coalesce in the ear, and produce an agreeable sensation called by Lord Kames a *tertium quid*. A dissonant interval, on the contrary, is that whose extremes, simultaneously heard, far from coalescing in the ear, and producing one agreeable sensation, are each of them plainly distinguished from the other, produce a grating effect upon the sense, and repel each other with an irreconcilable hostility. In proportion as the vibrations of different sonorous bodies, or of the same sonorous body in different modes, more or less frequently coincide during the same given time, the chords are more or less perfect, and consequently the intervals more or less consonant. When these vibrations never coincide at all in the same given time, the discord is consummate, and consequently the interval absolutely dissonant.

Intervals are not only divided according to their natures, but also with respect to their degrees. In this view, they are either enharmonic, chromatic, or diatonic. Of these therefore in their order, from the least to the greatest.

An enharmonic interval is what they call the *eighth part of a tone*, or the difference between a major and minor semitone generally distinguished by the name of a *comma*. Commas, however, are of three different kinds, as their quantities are more or less; but since these differences cannot be ascertained without long and intricate computations, it is not necessary for us to attempt an investigation, whose pursuit is so unpleasant, and whose result attended with so little utility. It has by musicians been generally called the *eighth part of a tone*; but they ought to have considered, that a comma is by no means the object of auricular perception, and that its estimate can only be formed by calculation. For a more minute disquisition of this matter, our readers may consult the article *COMMA* in the *Musical Dictionary*, or as mentioned in the article *MUSIC* in this *Work*. A chromatic interval consists properly of a minor semitone, but may also admit the major. A diatonic interval consists of a semitone-major at least, but may consist of any number of tones within the octave. When an octave higher or lower is assumed, it is obvious that we enter into another scale which is either higher or lower, but still a repetition of the former degrees of sound.

Intervals again are either simple or compound. All the intervals within any one octave are simple; such as the second major or minor, the third, the fourth, the fifth, the sixth, the seventh, &c. Of these afterwards. All intervals whose extremes are contained in different octaves, such as the ninth, the tenth, the eleventh, the twelfth, the thirteenth, the fourteenth, the fifteenth, &c. may be termed *compound intervals*.

The semitone either exactly or nearly divides the tone into two equal parts. In the theory of harmonical computation three kinds of semitones are recognised, viz. the greatest, the intermediate, and the smallest semitone. But in practice, to which these explications are chiefly adapted, the semitone is only distinguished into major and minor. The semitone major is the difference between the third major and the fourth, as E F. Its ratio is as 15 to 16, and it forms the least of all diatonic intervals.

The semitone minor consists of the difference between the third major and minor: it may be marked in the same degree

by a sharp or a flat, and it only forms a chromatic interval; its ratio is as 24 to 25.

Though some distinction is made between these semitones by the manner of marking them, yet on the organ and harpsichord no distinction can be made; nor is there any thing more common for us than to say, that D sharp in rising is E flat in descending, and so through the whole diapason above or below: besides, the semitone is sometimes major and sometimes minor, sometimes diatonic and sometimes chromatic, according to the different modes in which we compose or practise; yet in practice those are called *semitones* minor, which are marked by sharps or flats, without changing the degree; and semitones major are those which form the interval of a second.

With respect to the three semitones recognised in theory, the greatest semitone is the difference between a tone major and a semitone minor; and its ratio is as 25 to 27. The intermediate semitone is the difference between a semitone major and a tone major; and its ratio is as 128 to 135. In a word, the small semitone consists of the difference between the greatest and the intermediate semitone; and its ratio is as 125 to 128.

Of all these intervals, there is only the semitone major, which is sometimes admitted as a second in harmony.

The interval of a tone, which characterises the diatonic species of composition, is either major or minor. The former consists of the difference between the fourth and fifth; and its ratio is as 8 to 9: and the latter, whose ratio is as 9 to 10, results from the difference between the third minor and the fourth.

Seconds are distinguished into four kinds; two of which are not in practice sufficiently momentous to be mentioned. The second major is synonymous with the intervals of a tone; but as that tone may be either major or minor, its ratio may be either as 8 to 9, or as 9 to 10.

The second minor consists of the distance from B to C, or from E F; and its ratio is as 15 to 16.

The third is so called, because it consists of 2 gradations, or 3 diatonic sounds, as from G to B ascending, or from A to C, inclusive of the extremes; of which the first is a third major, composed of two full tones, and its ratio as 4 to 5; the second, a third minor, consisting of a tone and a semitone major, and its ratio as 5 to 6.

The fourth has by some been reckoned an imperfect, but more justly by others a perfect, chord. It consists of three diatonic degrees, but takes its name from the four different sounds of which it is formed; or, in other words, the number by which it is denominated includes the extremes. It is composed of a tone major, a tone minor, and a semitone major, as from C to F ascending; its ratio as 3 to 4.

The fifth next to the octave is, perhaps, the most perfect interval, as least susceptible of alteration. The number from whence it assumes its name likewise includes its extremes. It consists of two tones major, one minor, and a semitone major, as from A to E ascending; its ratio is as 2 to 3.

The sixth is not found among the natural order of consonances, but only admitted by combination. It is not here necessary to mention its various distinctions and uses, as we only give an account of intervals in general.

The sixth major consists of four tones, and a semitone major; as from G to E ascending; its ratio is as 3 to 5. The sixth minor contains three tones and two semitones major, as from E to C ascending; its ratio is as 5 to 8.

The seventh, as a reduplication of the second, is a dissonance. When major, it consists diatonically of five tones, three major, and two minor; and a major semitone, as from C to B ascending; its ratio is as 8 to 15.

When minor, it consists of four tones, three major and one minor, and two major semitones, as from E to D ascending; its ratio is as 5 to 9.

The octave is the most perfect of all chords, and in many cases hardly to be distinguished by the ear from an unison; that is to say, from that coincidence of sound produced by two musical strings, whose matter, lengths, diameters, and tensions, are the same. As the vibrations of two strings in unison during any given time are precisely coincident; so, whilst the lowest extreme of the octave vibrates once, the highest vibrates twice; and consequently its ratio is as 1 to 2, as from c to C ascending. It consists of six full tones and two semitones major. Its name is derived from the Latin *octo*, "eight;" because that number likewise includes its extremes. It may likewise be divided into twelve semitones. It contains the whole diatonic scale; and every series above or below consists only of the same returning sounds. From whence the natures, distances and powers, of every interval greater than the octave, as the ninth, the tenth, the eleventh, the twelfth, the thirteenth, the fourteenth, the fifteenth, the triple octave, &c. may easily be computed.

During our past observations upon the term *interval*, we have either wholly neglected our faithful associate M. Rousseau, or only maintained a distant and momentary intercourse with him. We now purpose to pay him a more permanent and familiar visit; but as he is engaged in the dispute between the Pythagoreans and Aristoxenians, we think it more advantageous to decline the controversy, and to follow him, after having escaped the fray, like a gentleman and a scholar. Having put the partisans of Aristoxenus to silence, let us, with him, forsake the lists of combat, nor stain his triumph by insulting the falling champions.

"We divide (says he), as did the ancients, intervals into consonant and dissonant. The consonances are perfect or imperfect (see CONSONANCE); dissonances are either such by nature, or become such by accident. There are only two intervals naturally dissonant, viz. the second and seventh, including their octaves or replications; nay, still these two may be reduced to one alone, as the seventh is properly no more than a replication of the second; for B, the seventh above the lowest C, where we have generally begun the scale, is really an octave above B, the note immediately below that C; and consequently the interval between these lower sounds is no more than that of a second major, to which all dissonances may therefore be ultimately reduced, whether considered as major or minor; but even all the consonances may become dissonant by accident. See DISCORD.

"Besides, every interval is either simple or reduplicated. Simple intervals are such as the limits of a single octave comprehend. Every interval which surpasses this extent is reduplicated; that is to say, compounded of one or more octaves, and of the simple interval whose replication it is.

"Simple intervals are likewise divided into direct and inverted. Take any simple interval whatever for a direct one; the quantity which, added to itself, is required to complete the octave, will be found an inverted interval; and the same observation holds reciprocally true of such as are inverted.

"There are only six kinds of simple intervals; of which three contain such quantities, as, added to the other three, are required to complete the octave: and of consequence likewise the one must be inversions of the other. If you take at first the smallest intervals, you will have, in the order of direct intervals, the second, the third, and fourth; for inverted, the seventh, the sixth, and fifth. Suppose these to be direct, the others will be inverted; every thing here is reciprocal.

"To find the name of any interval whatever, it is only necessary to add the denomination of unity to the degree which it contains. Thus, the interval of one degree shall give a second; of two, a third; of three, a fourth; of seven, an octave; of nine, a tenth, &c. But this is not sufficient to determine an interval with accuracy; for under the same name it may be either major or minor, true or false, diminished or redundant.

"The consonances which are imperfect, and the two natural dissonances, may be major or minor; which, without changing their degree, occasions in the interval the difference of a semitone; so that if, from a minor interval, we still deduce a semitone, it becomes an interval diminished; if, by a semitone, we increase a major interval, it becomes an interval redundant.

"The perfect consonances are by their nature invariable. When their intervals are such as they ought to be, we call them *just, true*; and if we dilate or contract this interval by a semitone, the consonance is termed *false*, and becomes a dissonance; *redundant*, if the semitone be added; *diminished*, if it be abstracted. We improperly give the name of a *false fifth* to the fifth diminished; this is taking the genus for the species: the fifth redundant is every jot as false as the diminished, it is even more so in every respect."

In the Musical Dictionary, plate C, fig. 2, may be seen a table of all the simple intervals practicable in music, with their names, their degrees, their values, and their ratios.

Having ascertained the distinction between major and minor intervals, it is only necessary to add; that these may be natural or artificial. Of the natural we have already given some account, by ascertaining the distances and ratios of such as have been mentioned. Of the artificial we may observe, that they are such as change their position from what it naturally is in the diatonic scale, to what the conveniency of composition or transposition requires it to be. A note thus artificially heightened by a semitone, together with the character which expresses that elevation, is called a *sharp*; on the contrary, a note artificially depressed by a semitone, together with the character by which that depression is signified, is called a *flat*. The character which restores a note thus depressed or raised to its primary state, is called a *natural*. Major or minor intervals, as they prevail, characterise the major or minor mode. See MODE.

INTESTATE, in law, a person who dies without making a will.

An heir *ab intestato*, is a person who inherits an estate by some other right than that of will or testament.

Heretofore, those who died *intestate* were held infamous, and accursed; in regard, by the canons of several councils, every person was enjoined to bequeath a part of his estate (and Matthew Paris says it was at least to be a tenth part) to the church, for the safety of his soul; which a person who neglected to make a will, and to leave this legacy to the church, was judged to have abandoned. Several councils took on them to command the priests to solicit dying persons to be charitable to the church; and this they did so earnestly, that absolution and the viaticum were denied to those whom they could not prevail on; so that they made no difference between these *intestates* and self-murderers; and they were alike denied Christian burial. Du Cange adds, that all who died without absolution, without receiving the viaticum, and without leaving alms to the church (even though they died suddenly), had their effects seized, and confiscated to the use of the church, bishop, &c.

In the English law there are two kinds of *intestates*: the one *de facto*, which are those who make no will at all; the other *de jure*, called also *quasi intestati*, which are those who make a will, but such an one as is null and void, either from the executors refusing to act, or from some other cause: in which case they are judged to die as *intestate, quasi-intestati*.

And the 22 and 23 Car. II. c. 10. commonly called the statute of distribution, appoints a distribution of *intestates'* estates, after debts and funeral expences are paid, among the wife and children of the deceased; or, for want of such, among the next of kin, &c. and the act of parliament doth, immediately upon the death of the *intestate*, vest an interest in the persons entitled; so that if any one dies before the distribution, though within

the year, his share shall go to his executors and administrators; and not to the survivors or next of kin to the *intestate*. 1. Lill. Abr. 487. The brothers and sisters of the *intestate* shall have equal shares with the mother. 1 Jac. II. c. 17. By the same statute it is enacted, that one third part of the surplusage of the estate of any person dying *intestate*, shall be distributed to his wife, and the residue amongst his children by equal portions, or among such persons as legally represent his children, in case any of them be then dead, excepting such child or children (not being heir at law) who shall have any estate by the settlement of the *intestate*, or shall be advanced by the *intestate* in his lifetime, by portion or portions equal to the share which shall by such distribution be allotted to the other children; and in case their portions have not been equal, they shall be made so as nearly as possible out of the said surplusage. But the heir at law is to have an equal part in the distribution with the rest of the children, without any consideration of the value of the land which he hath by descent or otherwise from the *intestate*. In case there be no children or legal representatives, one moiety of the said estate shall be allotted to the wife of the *intestate*, and the residue distributed equally to every of the next kindred of the *intestate*, who are in equal degree, and those who legally represent them; provided that there be no representations admitted among collaterals, after brothers and sisters children: and if there be no wife, the said estate shall be wholly distributed in equal shares among the children; or, if there be no child, to the next of kindred in equal degree, and their legal representatives. But no such distribution of the goods of an *intestate* should be made till after one year be fully expired after his death; and those to whom distribution is made are required to give bonds, with sufficient sureties, to refund in case of debts.

INTESTINE *Motion of the parts of fluids*, that which is among its corpuscles or component parts. When the attracting corpuscles of any fluid are elastic, they must necessarily produce an intestine motion; and that, greater or less, according to the degrees of their elasticity and attractive force. For, two elastic particles, after meeting, will fly from each other with the same degree of velocity with which they met; abstracting from the resistance of the medium. But when, in leaping back from each other, they approach other particles, their velocity will be increased.

A most important discovery has been made by Count Rumford, relative to the intestine motion produced in fluids, according as their particles become specifically heavier or lighter by the acquisition or deprivation of heat. See an account of this discovery under the article *PROPAGATION of Heat*.

INTESTINA, in the *Linnean System*, an order of worms. See *ZOOLOGY*.

INTESTINES, **INTESTINA**, in *anatomy*, the guts or bowels; those hollow, membranous, cylindrical parts, extended from the right orifice of the stomach to the anus; by which the chyle is conveyed to the lacteals, and the excrements are voided. See *ANATOMY*.

INTONATION, in music, the action of sounding the notes in the scale with the voice, or any other given order of musical tones. Intonation may be either true or false, either too high or too low, either too sharp or too flat; and then this word *intonation*, attended with an epithet, must be understood concerning the manner of performing the notes.

In executing an air, to form the sounds, and preserve the intervals as they are marked with justness and accuracy, is no inconsiderable difficulty, and scarcely practicable, but by the assistance of one common idea, to which, as to their ultimate test, these sounds and intervals must be referred: these common ideas are those of the key, and the mode in which the performer is engaged; and from the word *tone*, which is sometimes used in a sense almost identical with that of the key, the word *into-*

nation may perhaps be derived. It may also be deduced from the word *diatonic*, as in that scale it is most frequently convenient; a scale which appears most convenient and most natural to the voice. We feel more difficulty in our intonation of such intervals as are greater or lesser than those of the diatonic order; because, in the first case, the glottis and vocal organs are modified by gradations too large; or too complex, in the second.

INTRADOS, the interior and lower side, or curve, of the arch of a bridge, &c. In contradistinction from the *extrados*, or exterior curve, or line on the upper side of the arch. See *ARCHITECTURE*.

INTRENCHMENT, in the military art, any work that fortifies a post against an enemy who attacks. It is generally taken for a ditch or trench with a parapet. Intrenchments are sometimes made of fascines with earth thrown over them, of gabions, hogsheds, or bags filled with earth, to cover the men from the enemy's fire.

INTRIGUE, an assemblage of events or circumstances, occurring in an affair, and perplexing the persons concerned in it. In this sense, it is used to signify the nodus or plot of a play or romance; or that point wherein the principal characters are most embarrassed through the artifice and opposition of certain persons, or the unfortunate falling out of certain accidents and circumstances.

In tragedy, comedy, or an epic poem, there are always two designs. The first and principal is that of the hero of the piece: the second contains the designs of all those who oppose him. These opposite causes produce opposite effects, to wit, the efforts of the hero for the execution of his design, and the efforts of those who thwart it. As those causes and designs are the beginning of the action, so these efforts are the middle, and there form a knot or difficulty which we call the *intrigue*, that makes the greatest part of the poem. It lasts as long as the mind of the reader or hearer is suspended about the event of those opposite efforts: the solution or catastrophe commences when the knot begins to unravel, and the difficulties and doubts begin to clear up.

The intrigue of the *Iliad* is two-fold. The first comprehends three days fighting in Achilles's absence, and consists on the one side in the resistance of Agamemnon and the Greeks, and on the other in the inexorable temper of Achilles. The death of Patroclus unravels this intrigue, and makes the beginning of a second. Achilles resolves to be revenged, but Hector opposes his design; and this forms the second intrigue, which is the last day's battle. In the *Æneid* there are also two intrigues. The first is taken up in the voyage and landing of Æneas in Italy; the second is his establishment there: the opposition he met with from Juno in both these undertakings, forms the intrigue.

As to the choice of the intrigue, and the manner of unravelling it, it is certain they ought both to spring naturally from the ground and subject of the poem. Bossu gives us three manners of forming the intrigue of a poem: the first is that already mentioned; and the second is taken from the fable and design of the poet; in the third the intrigue is so laid, as that the solution follows from it of course.

INTRINSIC, a term applied to the real and genuine values and properties, &c. of any thing, in opposition to their *extrinsic* or *apparent* values.

INTRODUCTION, in general, signifies any thing which tends to make another in some measure known before we have leisure to examine it thoroughly; and hence it is used on a great variety of occasions. Thus we speak of the introduction of one person to another; the introduction to a book, &c.—It is also used to signify the actual motion of any body out of one place into another, when that motion has been occasioned by some other body.

INTRODUCTION, in oratory. See *ORATORY*.

INTUITION, among logicians, the act whereby the mind perceives the agreement or disagreement of two ideas, immediately by themselves, without the intervention of any other; in which case the mind perceives the truth as the eye does the light only by being directed towards it. See **LOGIC**.

INTUITIVE EVIDENCE, is that which results from **INTUITION**. Dr. Campbell distinguishes different sorts of *intuitive* evidence; one resulting purely from intellection, or that faculty which others have called intuition; another kind arising from consciousness; and a third sort from that now-named faculty *Common Sense*, which this ingenious writer, as well as several others, contends to be a distinct original source of knowledge, whilst others refer its supposed office to the *intuitive* power of the understanding.

INVALID, a person wounded, maimed, or disabled for action by age. At Chelsea and Greenwich are magnificent **HOSPITALS** or colleges, built for the reception and accommodation of *invalids*, or soldiers and seamen worn out in the service. We have also twenty independent companies of invalids, dispersed in the several forts and garrisons. At Paris is a college of the same kind, called *les Invalides*, which is accounted one of the finest buildings in that city.

INVECTED, in heraldry, denotes a thing fluted or furrowed. See **HERALDRY**.

INVECTIVE, in rhetoric, differs from reproof, as the latter proceeds from a friend, and is intended for the good of the person reproofed; whereas the invective is the work of an enemy, and entirely designed to vex and give uneasiness to the person against whom it is directed.

INVEGES (**AUGUSTIN**), a learned Sicilian Jesuit, wrote in Italian an History of the city of Palermo, and other works, which are esteemed. He died in 1677, aged 82.

INVENTION, denotes the act of finding any thing new, or even the thing thus found. Thus we say, *the invention of gunpowder, of printing, &c.* The alcove is a modern invention owing to the Moors. The Doric, Ionic, and Corinthian orders are of Greek invention; the Tuscan and Composite of Latin invention. Janſon ab Almelooven has written an Onomasticon of inventions; wherein are shown, in an alphabetical order, the names of the inventors, and the time, place, &c. where they are made. Panciroillus has a treatise of old inventions that are lost, and new ones that have been made; Polydore Virgil has also published eight books of the inventors of things. *De Inventoribus Rerum*.

INVENTION is also used for the finding of a thing hidden. The Romish church celebrates a feast on the 4th of May, under the title of *Invention of the Holy Cross*.

INVENTION is also used for subtilty of mind, or somewhat peculiar to a man's genius, which leads him to a discovery of things new; in which sense we say, *a man of invention*.

INVENTION, in painting, is the choice which the painter makes of the objects that are to enter the composition of his piece. See **PAINTING**.

INVENTION, in poetry, is applied to whatever the poet adds to the history of the subject he has chosen; as well as to the new turn he gives it. See **POETRY**.

INVENTION, in rhetoric, signifies the finding out and choosing of certain arguments which the orator is to use for the proving or illustrating his point, moving their passions, or conciliating the minds of his hearers. Invention, according to Cicero, is the principal part of oratory: he wrote four books *De Inventionibus*, whereof we have but two remaining. See **ORATORY**.

INVENTORY, in law, a catalogue or schedule, orderly made, of all a deceased person's goods and chattels, at the time of his death, with their value appraised by indifferent persons, which every executor or administrator is obliged to exhibit to the ordinary at such time as he shall appoint. By 21 Hen. VIII.

c. 5, executors and administrators are to deliver in upon oath to the ordinary, indented inventories, one part of which is to remain with the ordinary, and the other part with the executor or administrator; this is required for the benefit of the creditors and legatees, that the executor or administrator may not conceal any part of the personal estate from them. The statute ordains that the inventory shall be exhibited within three months after the person's decease; yet it may be done afterwards, for the ordinary may dispense with the time, and even with its being ever exhibited, as in cases where the creditors are paid, and the will is executed.

INVERARY, a royal borough of Scotland, in Argyleshire, seated on the N. W. side of Loch Fyne. In the neighbourhood of this place is a considerable iron work. It is 75 miles N.W. of Edinburgh, and 45 N.W. of Glasgow. W. lon. 5. o. N. lat. 56. 16.

INVERBERVIE, or **BERVIE**, a town of Kincardineshire or the Mearns, 13 miles N. E. from Montrose. It lies between two small hills, which terminate in high cliffs towards the sea; and though a royal borough, and the only one in the country, it is but a small place, the inhabitants of which are chiefly employed in making thread.

INVERKEITHING, a parliament-town of Scotland, in the county of Fife, situated on the northern shore of the Frith of Forth, in W. lon. 3. 15. N. lat. 56. 5. It was much favoured by William, who granted its first charter. He extended its liberties considerably, and in the time of David I. it became a royal residence. The Moubrays had large possessions here, which were forfeited in the reign of Robert II. The Franciscans had a convent in this town; and, according to Sir Robert Sibbald; the Dominicans had another. This town has a considerable trade in coal and other articles.

INVERLOCHY, an ancient castle in the neighbourhood of **FORT WILLIAM** in Invernesshire. It is adorned with large round towers; and, by the mode of building, seems to have been the work of the English in the time of Edward I. who laid large fines on the Scotch barons for the purpose of erecting new castles. The largest of these towers is called *Camin's*. But long prior to these ruins, Inverlochy, according to *Lochee*, had been a place of great note, a most opulent city, remarkable for the vast resort of French and Spaniards, probably on account of trade. It was also a seat of the kings of Scotland, for here Achais in the year 790 signed (as is reported) the league offensive and defensive between himself and Charlemagne. In after-times it was utterly destroyed by the Danes, and never again restored.

In the neighbourhood of this place were fought two fierce battles, one between Donald Balloch brother to Alexander lord of the Isles, who with a great power invaded Lochaber in the year 1427: he was met by the earls of Mar and Cathness; the last was slain, and their forces totally defeated. Balloch returned to the isles with vast booty, the object of those plundering chieftains. Here also the Campbells under the marquis of Argyle, in February 1645, received from Montrose an overthrow fatal to numbers of that gallant name. Fifteen hundred fell in the action and in the pursuit, with the loss only of three to the royalists. Sir Thomas Ogilvie, the friend of Montrose, died of his wounds. His death suppressed all joy for the victory.

INVERNESS, a royal borough of Scotland, capital of a county of the same name, pleasantly situated on the S. bank of the river Ness, and overlooking the frith of Murray. It has a safe and convenient harbour, and a good deal of shipping. Several large buildings have been erected on the N. side of the town, in which a considerable manufactory of ropes and canvass is carried on. It is a populous and flourishing town, being the chief market to a wide tract of surrounding country. An academy is intended to be erected here on an extensive scale;

a liberal subscription having been entered into for that benevolent purpose. On an eminence above the town are the ruins of the old castle of Inverness, demolished by the rebels in 1746. Over the river Ness is a handsome bridge of seven arches. The salmon fishery in this river is very considerable, and is let to some fishmongers of London. Near this town, on the wide heath, called Culloden Muir, the duke of Cumberland gained a decisive victory over the rebels in 1746; and a little to the W. of this town is the remarkable vitrified fort called Craig Phadrick: the stones composing its walls appear to have been partly melted by fire. Inverness is 5 miles N. E. of Fort William, and 106 N. of Edinburgh. W. lon. 4. 5. N. lat. 57. 30.

INVERNESS-SHIRE, the most extensive county of Scotland, bounded on the N. by Ross-shire; on the E. by the counties of Nairne, Murray, and Aberdeen; on the S. by those of Perth and Argyle; and on the W. by the channel called the Minch. Its extent from N. to S. is above 50 miles, and from E. to W. about 80. The northern part is very mountainous and barren. The woody mountains are the haunts of stags and roes. The heath is possessed by black game and grouse; and the lofty summits of the hills by ptarmigans and alpine hares. This county has several considerable lakes; being divided, in a manner, into two equal parts, by Loch Ness, Loch Oich, Loch Lochy, and Loch Eil; all which might be united by a canal, that would form a communication between the two seas. Of most of the great lakes in this county, it is remarkable, that, notwithstanding the coldness of the climate, they are seldom or never known to freeze; much less are the arms of the sea, even in the most northern parts of Scotland, subject to be frozen in the hardest seasons; while the Texel, and many bays and great rivers in Holland and Germany, are covered with ice. The southern part of the shire is also very mountainous, and is supposed to be the most elevated ground in Scotland. The extensive plains which surround the lakes are in general fertile; and the high grounds feed many sheep and black cattle, the rearing and selling of which is the chief trade of the inhabitants. Limestone, iron ore, and some traces of different minerals have been found in this county, with beautiful rock crystals of various tints; but no mines have been worked hitherto with much success. The principal river is the Spey; but there are many others of inferior note, as the Ness, Fyers, Glass, Lochy, &c. The common people in the high parts of the country, and on the western shore, speak Gaelic; but the people of fashion in Inverness, and its neighbourhood, use the English language, and pronounce it with propriety.

INVERSE, is applied to a manner of working the rule of three, or proportion, which seems to go backward, i. e. reverse or contrary to the order of the common and direct rule: so that, whereas, in the direct rule, more requires more, or less requires less; in the Inverse rule, on the contrary, more requires less, or less requires more. For instance, in the direct rule it is said, If 3 yards of cloth cost 20 shillings, how much will 6 yards cost? The answer is 40 shillings: where more yards require more money, and less yards require less money. But in the Inverse rule it is said, If 20 men perform a piece of work in 4 days, in how many days will 40 men perform as much? where the answer is 2 days; and here the more men require the less time, and the fewer men the more time.

INVERSE Method of Fluxions, is the method of finding fluents, from the fluxions being given; and is similar to what the foreign mathematicians call the Calculus Integralis.

INVERSE Method of Tangents, is the method of finding the curve belonging to a given tangent; as opposed to the direct method, or the finding the tangent to a given curve. As, to find a curve whose subtangent is a third proportional to $r-y$ and y , or whose subtangent is equal to the semiordinate, or whose subnormal is a constant quantity.—The solution of

this problem depends chiefly on the Inverse method of FLUXIONS.

INVERSE Proportion, or INVERSE Ratio, is that in which more requires less, or less requires more. As for instance, in the case of light, or heat from a luminous object, the light received is less at a greater distance, and greater at a less distance; so that here more, as to distance, gives less, as to light, and less distance gives more light. This is usually expressed by the term Inversely, or Reciprocally; as in the case above, where the light is Inversely, or Reciprocally, as the square of the distance; or in the Inverse or Reciprocal duplicate ratio of the distance.

INVERSION, *Invertendo*, or *by Inversion*, according to the 14th definition of Euclid, lib. 5. is Inverting the terms of a proportion. by changing the antecedents into consequents, and the consequents into antecedents. As in these, $a : b :: c : d$, then by Inversion $b : a :: d : c$.

INVERSION, in grammar, is where the words of a phrase are ranged in a manner not so natural as they might be. For instance: "Of all vices, the most abominable, and that which least becomes a man, is impurity." Here is an inversion; the natural order being this: Impurity is the most abominable of all vices, and that which least becomes a man.—An inversion is not always disagreeable, however, but sometimes has a very harmonious effect.

INVERTED, in music, is derived from the Latin preposition *in*, and *vertere* "to turn any thing a contrary way." The analogy of this term, and its use in music, will appear more obvious from the sequel.

It signifies a change in the order of the notes which form a chord, or in the parts which compose harmony: which happens by substituting in the bass those sounds which ought to have been in the upper part: an operation not only rendered practicable, but greatly facilitated, by the resemblance which one note has to another in different octaves; whence we derive the power of exchanging one octave for another with so much propriety and success, or by substituting in the extremes those which ought to have occupied the middle station; and *vice versa*.

It is certain, that in every chord there must be a fundamental and natural order, which is the same with that of its generation: but the circumstances of succession, taste, expression, the beauty of melody, and variety, the approximation of harmony, frequently oblige the composer to change that order by inverting the chords, and of consequence the disposition of the parts.

As three things may be arranged in six different orders, and four things in twenty-four; it would seem at first, that a perfect chord should be susceptible of six inversions, and a dissonant chord of twenty-four; since one is composed of four and the other of three sounds, and since inversion consists only in a transposition of octaves. But it must be observed, that in harmony all the different dispositions of acuter sounds are not reckoned as inversions, whilst the same sounds remain in the lower parts. Thus, these two orders of the perfect chord *ut mi sol*, or C E G, and *ut sol mi*, or C G E, are only taken for the same inversion, and only bear the same name: this reduces the whole of inversions of which a perfect chord is susceptible to three; that is to say, to as many inversions as the chord contains different sounds: for the replications of the same sound are here reckoned as nothing.

Every time, therefore, when the fundamental bass is heard in the lowest parts, or, if the fundamental bass be retrenched, every time when the natural order is preserved in the chords, the harmony is direct. As soon as that order is changed, or as soon as the fundamental sounds, without being in the lower parts, are heard in some of the others, the harmony is *inverted*. It is an inversion of the chord, when the fundamental sound

is transposed; it is likewise an inversion of the harmony, when the treble or any other part moves as the bass ought to have done.

Every where, where a direct chord can be well placed, its inversions will likewise be so with respect to the harmony; for it is still the same fundamental succession. Thus, at every note of the fundamental bass, it is in the power of the composer to arrange the chord at his pleasure, and of consequence every moment to produce different inversions; provided that he does not change the regular and fundamental succession; provided also, that the dissonances may always be prepared and resolved in the same parts where they are first heard, that the sensible note may always ascend, and that such false relations may be avoided as would be too harsh upon the ear in the same part. This is the key of these mysterious distinctions which composers have made between those chords where the treble is syncopated, and those in which the bass ought to be syncopated; as, for instance, between the ninth and the second: it is thus that in the first the chord is direct, and the dissonance in the treble; in the others, the chord is reversed, and the dissonance in the bass.

With respect to chords by supposition, greater precaution is necessary in inverting them. As the sound which they add to the bass is absolutely foreign to the harmony; it is often only tolerable there, on account of its vast distance from the other sounds, which renders the dissonance less harsh. But if these added sounds should happen to be transposed in the higher parts, as it sometimes does; if this transposition be not performed with much art, it may produce a very bad effect; and never can this be happily practised without taking away some other sound from the chord. See, at the article ACCORD in the Musical Dictionary, the cases when *inversion* may be practised, and the choice of such as are proper.

The perfect knowledge of *inversion* depends on art and study alone: the choice is a different matter; to this an ear and a taste are necessary; experience of the different effects is likewise indispensable; and though the choice of inversions be indifferent with respect to the foundation of the harmony, it is by no means such in regard of the effect and expression. It is certain, that the fundamental bass is formed to support the harmony, and to prevail beneath. Every time therefore when the order is changed and the harmony inverted, there ought to be good reasons for it: without which, the composer will fall into the vice of our more recent music, where the melody of the treble is often like what the bass should be, and the bass always like that of the treble, where every thing is confounded, reversed, disordered, without any other reason than to subvert the established order, and to spoil the harmony.

INVERURY, a small borough of Aberdeenshire, in Scotland, situated on the beautiful and fertile banks of the river Don, just above its confluence with the river called Urie Water. Inverury is 15 miles N. W. of Aberdeen.

INVESTIGATION, properly denotes the searching or finding out any thing by the tracks or prints of the feet; whence mathematicians, schoolmen, and grammarians, come to use the term in their respective researches.

INVESTING a PLACE, in the art of war, is when a general, having an intention to besiege it, detaches a body of horse to possess all the avenues; blocking up the garrison, and preventing supplies from getting into the place, till the army and artillery are got up to form the siege.

INVESTITURE, in law, a giving livery of seisin or possession. There was anciently a great variety of ceremonies used upon investitures; as at first they were made by a certain form of words, and afterwards by such things as had the greatest resemblance to the thing to be transferred: thus, where lands were intended to pass, a turf, &c. was delivered by the granter

to the grantee. In the church, it was customary for princes to make investiture of ecclesiastical benefices, by delivering to the person they had chosen a pastoral staff and a ring.

INULA, ELECAMpane; a genus of the polygamia superflua order, belonging to the syngenesia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked; the pappus simple; the antheræ, at the base, ending in two bristles. There are 22 species, of which the helenium, or common elecampane, is the most remarkable. It is a native of Britain; but is cultivated in gardens for the sake of the root, which is used in medicine. The root is perennial, thick, branching, and of a strong odour. The lower leaves are eight or nine inches long, and four broad in the middle. rough on their upper side, but downy on the under side. The stalks rise about four feet high, and divide toward the top into several smaller branches, garnished with oblong oval leaves indented on their edges, ending in acute points. Each branch is crowned with one large yellow radiated flower, succeeded by narrow four cornered seeds, covered with down. It may be propagated in autumn by seeds or offsets.

The root of elecampane, especially when dry, has an agreeable aromatic smell; its taste, on chewing, is glutinous, and as it were somewhat rancid; in a little time it discovers an aromatic bitterness, which by degrees becomes considerably acrid and pungent. The old practitioners in medicine ranked it in the class of alexipharmics; and principally recommended it for promoting expectoration in asthmas and coughs. Liberally taken, it is said to excite urine, and to loosen the belly. In some parts of Germany, large quantities of this root are candied, and used as a stomachic for strengthening the tone of the viscera. Proof spirit will extract its virtues in greater perfection than water. The former scarce elevates any thing in distillation: with the latter an essential oil arises, which concretes into white flakes. This possesses at first the flavour of the elecampane, but is very apt to lose it in keeping. Outwardly applied, a decoction of it is said to cure the itch. The root bruised and macerated in urine with balls of ashes and whortleberries, dyes a blue colour.

INUNDATÆ, the name of the 15th order in Linnæus's Fragments of a natural method; consisting of plants which grow in the water. See BOTANY, p. 50.

INUNDATION, a sudden overflowing of the dry land by the waters of the ocean, rivers, lakes, springs, or rains. In the Transactions of the Society for the Encouragement of Arts for the year 1796, p. 238, Mr. Bramley, of Leeds, gives the following account of a method of constructing banks to guard against the inundation of the sea. He says, "The procuring of new scenes, on which industry may act with profit, is so desirable an object, that I hope the Society's excuse for introducing an idea, which, should it answer, may be of considerable utility, and which is, the application of the system of puddling in embankments made near to the sea, and liable to be overflowed at spring tides. In such situations, water is to be found almost with certainty at a few feet under the surface; and the great bar to inclosure or embankment in such situations being the difficulty which occurs in giving sufficient density to the bank, and thereby enabling it to resist the spring tides, the following mode would, it is supposed (where a small portion of ooze is intermixed with the sand), be capable of binding the same so firmly, as to give it a density sufficient to resist the impulse of the tide. Having first laid out, ideally, the ground intended to be embanked, it will be necessary to fix pumps at one or both ends of, or more spaces in the line, capable of throwing up considerable quantities of water; and, in proportion to the work intended to be done, to have extra hands, rather than be in any respect deficient: the line should then be drawn with a convexity to the water, and the soil dug

over and puddled as a base, continuing the same mode for every five or six inches thickness of soil thrown on above the surface, and guarded by an external wall of loose earth or silt: the pumps at each end should be set to work, making a channel for the water to run centrally along the bank, and, as fast as it could proceed, to have parties stationed ready to puddle it nearly from side to side; which being brought to a proper consistence, another layer should be thrown thereon, and in a curving shape, narrowing upwards from the base: the same process in puddling should be then renewed, and alternate applications of fresh soil and puddling be proceeded on, until the bank is raised to the height sufficient to guard against the highest tides.

Earth in this puddled state becomes so dense as to resist the impression of water, which can by no means penetrate it; and though the experiment has not to my knowledge been before thought of, or tried in such situation, yet I apprehend it will, by this means, acquire a compactness of substance, sufficient to withstand every common effort of the tides: after it is once completed, and by strewing a few hay-seeds on the curving sides, it would probably soon be covered with a complete greenward, which would be forwarded much by the moisture exhaling from the adjoining puddled earth; thus answering the double purpose, of making the internal earth cohesive, and promoting vegetation on the surface. The idea originated in reflecting on the solidity attained in the puddled banks of canals, &c. which mode might probably be thus applied to purposes of unbounded utility; and where under-drains are necessary to quit land-floods or streams, care might be taken, prior to forming the bank, to leave proper vacancies for their reception, after its completion. Should these hints be thought worthy of attention by the Society, I hope their public recommendation will induce a trial to prove the efficacy; and the hearing of attendant success will give a great pleasure to one who wishes to promote every object conducive to the progress of agriculture."

INVOCATION, in theology, the act of adoring God, and especially of addressing him in prayer for his assistance and protection. See the articles ADORATION and PRAYER. The difference between the invocation of God and of the saints, as practised by the Papists, is thus explained in the catechism of the council of Trent: "We beg of God (says the catechism) to give us good things, and to deliver us from evil; but we pray to the saints, to intercede with God and obtain those things which we stand in need of. Hence we use different forms in praying to God and to the saints: to the former we say, *Hear us, have mercy on us*; to the latter we only say, *Pray for us*." The council of Trent expressly teaches, that the saints who reign with Jesus Christ offer up their prayers to God for men; and condemns those who maintain the contrary doctrine. The Protestants reject and censure this practice, as contrary to scripture, deny the truth of the fact, and think it highly unreasonable to suppose that a limited finite being should be in a manner omni-present, and at one and the same time hear and attend to the prayers that are offered to him in England, China, and Peru; and from thence infer, that if the saints cannot hear their requests, it is inconsistent with common sense to address any kind of prayer to them.

INVOCATION, in poetry, an address at the beginning of a poem, wherein the poet calls for the assistance of some divinity, particularly of his muse, or the deity of poetry.

INVOICE, an account in writing of the particulars of merchandize, with their value, custom, charges, &c. transmitted by one merchant to another in a distant country.

INVOLUCRUM, among botanists, expresses that sort of cup which surrounds a number of flowers together, every one of which has beside this general cup its own particular perian-

thium. The involucre consists of a multitude of little leaves disposed in a radiated manner. See CALYX.

INVOLUTION, in algebra, the raising any quantity from its root to any height or power assigned. See ALGEBRA, p. 105.

IO, in fabulous history, daughter of Inachus, or according to others of Jasus or Pirene, was priestess of Juno at Argos. Jupiter became enamoured of her; but Juno, jealous of his intrigues, discovered the object of his affection, and surprised him in the company of Io. Jupiter changed his mistress into a beautiful heifer; and the goddess, who well knew the fraud, obtained from her husband the animal whose beauty she had condescended to commend. Juno commanded the hundred-eyed Argus to watch the heifer; but Jupiter, anxious for the situation of Io, sent Mercury to destroy Argus, and to restore her to liberty. Io, freed from the vigilance of Argus, was now persecuted by Juno, who sent one of the Furies to torment her. She wandered over the greatest part of the earth, and crossed over the sea, till at last she stopped on the banks of the Nile, still exposed to the unceasing torments of the Fury. Here she entreated Jupiter to restore her to her natural form; and when the god had changed her from a heifer into a woman, she brought forth Epaphus. Afterwards she married Telegonus king of Egypt, or Oiris according to others; and she treated her subjects with such mildness and humanity, that after death she received divine honours, and was worshipped under the name of *Isis*. According to Herodotus, Io was carried away by Phœnician merchants, who wished to make reprisals for Europa, who had been stolen from them by the Greeks.

JOAB, general of the army of king David, defeated the Syrians and the other enemies of David, and took the fort of Zion from the Jebusites, who, thinking it impregnable, committed it to the care of the lame and blind, whom they placed on the walls. He signalized himself in all David's wars, but was guilty of basely murdering Abner and Amasa. He procured a reconciliation between Absalom and David; and afterwards slew Absalom, contrary to the express orders of the king. He at length joined Adonijah's party; and was put to death by the order of Solomon, 1014 B. C.

JOACHIMITES, in church history, the disciples of Joachim a Cistercian monk, who was an abbot of Flora in Calabria, and a great pretender to inspiration. The Joachimites were particularly fond of certain ternaries: The Father, they said, operated from the beginning till the coming of the Son; the Son from that time to theirs, which was the year 1260; and from that time the Holy Spirit was to operate in his turn. They also divided every thing relating to men, to doctrine, and the manner of living, into three classes, according to the three persons in the Trinity. The first ternary was that of men; of whom the first class was that of married men, which had lasted during the whole period of the Father; the second was that of clerks, which had lasted during the time of the Son; and the last was that of the monks, in which there was to be an uncommon effusion of grace by the Holy Spirit. The second ternary was that of doctrine, viz. the Old Testament, the New, and the everlasting Gospel; the first they ascribed to the Father, the second to the Son, and the third to the Holy Spirit. A third ternary consisted in the manner of living: viz. under the Father men lived according to the flesh; under the Son, they lived according to the flesh and the spirit; and under the Holy Ghost, they were to live according to the spirit only.

JOAN (Pope), called by Platina *John VIII.* is said to have held the holy see between Leo IV. who died in 855, and Benedict III. who died in 858. Marianus Scotus says, she sat two years five months and four days. Numberless have been the controversies, fables, and conjectures, relating to this pope. It is said that a German girl, pretending to be a man, went to Athens, where she made great progress in the sciences; and

afterwards came to Rome in the same habit. As she had a quick genius, and spoke with a good grace in the public disputations and lectures, her great learning was admired, and every one loved her extremely; so that after the death of Leo she was chosen Pope, and performed all offices as such. Whilst she was in possession of this high dignity, she was got with child; and as she was going in a solemn procession to the Lateran church, she was delivered of that child, between the Coliseum and St. Clement's church, in a most public street, before a crowd of people, and died on the spot, in 857. By way of embellishing this story, may be added the precaution reported to have been afterward taken to avoid such another accident. After the election of a pope, he was placed on a chair with an open seat, called the *groping chair*, when a deacon came most devoutly behind and satisfied himself of the pontiff's sex by feeling. This precaution however, has been long deemed unnecessary, because the cardinals now always get bastards enough to establish their virility before they arrive at the pontificate.

JOACHIMS-THAL, that is to say, the valley of St. Joachim, a town and valley of Bohemia, in the circle of Elnobogen. A rich silver mine was discovered in it at the beginning of the 16th century.

JOAN d'Arc, or the Maid of Orleans, whose heroic behaviour in reanimating the expiring valour of the French nation, though by the most superstitious means (pretending to be inspired), deserved a better fate. She was burnt by the English as a sorceress in 1411, aged 24.

JOANNA (St.), one of the Comora-islands in the Indian ocean. See HINZUAN.

JOB, or *Book of Job*, a canonical book of the Old Testament, containing a narrative of a series of misfortunes which happened to a man whose name was *Job*, as a trial of his virtue and patience; together with the conferences he had with his cruel friends on the subject of his misfortunes, and the manner in which he was restored to ease and happiness. This book is filled with those noble, bold and figurative expressions which constitute the very soul of poetry.

Many of the Jewish rabbins pretend that this relation is altogether a fiction; others think it a simple narrative of a matter of fact, just as it happened: whilst a third sort of critics acknowledge, that the groundwork of the story is true, but that it is written in a poetical strain, and decorated with peculiar circumstances, to render the narration more profitable and entertaining.

The time is not set down in which Job lived. Some have thought that he was much ancients than Moses, because the law is never cited by Job or his friends, and because it is related that Job himself offered sacrifices. Some imagine that this book was written by himself; others say, that Job wrote it originally in Syriac or Arabic, and that Moses translated it into Hebrew: but the rabbins generally pronounce Moses to be the author of it; and many Christian writers are of the same opinion.

JOBB: R, a person who undertakes jobs, or small pieces of work. In some statutes, jobber is used for a person who buys and sells for others. See BROKER.

JOBBING, the business of a jobber. Thus the practice of trafficking in the public funds, or of buying and selling stock with a view to its rise or fall, is called *Stock Jobbing*. The term indeed is most commonly applied to the illegal practice of buying and selling stock for time, or of accounting for the differences in the rise or fall of any particular stock for a stipulated time, whether the buyer or seller be possessed of any such real stock or not. See STOCK BROKER.

JOBERT (LEWIS), a pious and learned Jesuit, born at Paris in 1647. He distinguished himself as a preacher; and besides several other tracts wrote a treatise entitled *La Science des Mé-*

daillies, which is in some esteem. He died in 1710; and the best edition of this work is that of Paris in 1739, 2 vols. 12mo.

JOCASTA, in fabulous history, a daughter of Menœceus, who married Laius king of Thebes, by whom she had Œdipus. She afterwards married her son Œdipus, without knowing who he was, and had by him Eteocles, Polynices, &c. When she discovered that she had married her own son, and been guilty of incest, she hanged herself in despair. She is called *Epicasta* by some mythologists.

JOCKEY, in the management of horses, the person who trims up, artfully conceals the defects of horses, and rides them about for sale.

JODE (PETER de), an engraver of some note, was a native of Antwerp. He received his first instructions in the art of engraving from Henry Goltzius; and afterwards went to Italy, in order to complete his studies from the works of the great masters. He engraved several plates in that country from different painters; and returned to Antwerp about the year 1601, where he resided till the time of his death, which happened A. D. 1634. His works are very numerous, and possess a considerable share of merit.

JODE (Peter de) the younger, was son to the former, and born in 1606. From his father he learned the art of engraving, and surpassed him in taste and the facility of handling the graver; though he can scarcely be said to have equalled him in correctness of drawing, especially when confined to the naked parts of the human figure. It does not appear that he went to Italy; but he accompanied his father to Paris, where they engraved conjointly a considerable number of plates for M. Bonfant, and Le Sieur L'Imago. His most capital performances are from Rubens and Vandyck. Bâillon says of him, that in several of his engravings he has "equalled the best engravers, and in others he has sunk below himself." The time of his death is not known. He left a son, *Arnold*, who was also an engraver, but of very inferior merit.

JODELLE (STEPHEN), lord of Limodin, was born at Paris in 1532; and distinguished himself so greatly by his poetical talents that he was reckoned one of the Pleiades celebrated by Ronfard. He is said to be the first Frenchman who wrote plays in his own language according to the ancient form. He was remarkably ready at composition, writing without study or labour; and was well skilled in polite arts and genteel exercises. In his younger years he embraced the reformed religion, and wrote a satire on the mass in 100 Latin verses; yet all of a sudden returned to that mass again. He died in 1579, very poor.

JOEL, or *the Prophecy of Joel*, a canonical book of the Old Testament. Joel was the son of Pethuel, and the second of the twelve lesser prophets. The style of this prophet is figurative, strong, and expressive. He upbraids the Israelites for their idolatry, and foretels the calamities they should suffer as the punishment of that sin: but he endeavours to support them with the comfort that their miseries should have an end upon their reformation and repentance. Some writers, inferring the order of time in which the minor prophets lived from the order in which they are placed in the Hebrew copies, conclude that Joel prophesied before Amos, who was contemporary with Uzziah, king of Judah. Archbishop Usher makes this inference from Joel's foretelling that drought, chap. i. which Amos mentions as having happened, chap. iv. 7, 8, 9. If we consider the main design of Joel's prophecy, we shall be apt to conclude, that it was uttered after the captivity of the ten tribes; for he directs his discourse only to Judah, and speaks distinctly of the sacrifices and oblations that were daily made in the temple.

JOGHIS, a sect of heathen religious in the East Indies, who

never marry, nor hold any thing in private property ; but live on alms, and practise strange severities on themselves. They are subject to a general, who sends them from one country to another to preach. They are, properly, a kind of penitent pilgrims; and are supposed to be a branch of the ancient Gymnosophists. They frequent, principally, such places as are consecrated by the devotion of the people, and pretend to live several days together without eating or drinking. After having gone through a course of discipline for a certain time, they look on themselves as impeccable, and privileged to do any thing ; upon which they give a loose to their passions, and run into all manner of debauchery.

JOGUES, or YOOGS, certain ages, æras, or periods of extraordinary length, in the chronology of the Hindoos. They are four in number ; of which the following is an account, extracted from Halhed's Preface to the Code of Gentoo Laws, p. xxxvi.

1. The *Suttee Jogue* (or age of purity) is said to have lasted three million two hundred thousand years ; and they hold that the life of man was extended in that age to one hundred thousand years ; and that his stature was twenty-one cubits.

2. The *Tirtah Jogue* (in which one-third of mankind was corrupted) they suppose to have consisted of two million four hundred thousand years, and that men lived to the age of ten thousand years.

3. The *Dwapaar Jogue* (in which half of the human race became depraved) endured one million six hundred thousand years, and the life of man was then reduced to a thousand years.

4. The *Collee Jogue* (in which all mankind are corrupted, or rather lessened, for that is the true meaning of *Collee*) is the present æra, which they suppose ordained to subsist four hundred thousand years, of which near five thousand are already past ; and the life of man in that period is limited to one hundred years.

Concerning the Indian chronology, we have already had occasion to say something under the article HINDOOS. We shall here, however, subjoin Dr. Robertson's observations on the above periods, from the Notes to his *Historical Disquisition concerning India*.

" If (says he) we suppose the computation of time in the Indian chronology to be made by solar or even by lunar years, nothing can be more extravagant in itself, or more repugnant to our mode of calculating the duration of the world, founded on sacred and infallible authority. From one circumstance, however, which merits attention, we may conclude, that the information which we have hitherto received concerning the chronology of the Hindoos is very incorrect. We have, as far as I know, only five original accounts of the different Jogues or æras of the Hindoos. The first is given by M. Roger, who received it from the Brahmins on the Coromandel coast. According to it, the *Suttee Jogue* is a period of one million seven hundred and twenty-eight thousand years ; the *Tirtah Jogue* is one million two hundred and ninety-six thousand years ; the *Dwapaar Jogue* is eight hundred and sixty-four thousand. The duration of the *Collee Jogue* he does not specify. (*Porte Ouverte*, p. 179.) The next is that of M. Bernier, who received it from the Brahmins of Benares. According to him, the duration of the *Suttee Jogue* was two million five hundred thousand years ; that of the *Tirtah Jogue* one million two hundred thousand years ; that of the *Dwapaar Jogue* is eight hundred and sixty-four thousand years. Concerning the period of the *Collee Jogue*, he likewise is silent. (*Voyages*, tom. ii. p. 160.) The third is that of Colonel Dow ; according to which the *Suttee Jogue* is a period of fourteen million of years, the *Tirtah Jogue* one million eighty thousand, the *Dwapaar Jogue* seventy-two thousand, and the *Collee Jogue* thirty-six

thousand years. (*Hist. of Hindost.* vol. 1. p. 2.) The fourth account is that of M. Le Gentil, who received it from the Brahmins of the Coromandel coast ; and as his information was acquired in the same part of India, and derived from the same source with that of M. Roger, it agrees with his in every particular. (*Mém. de l'Acad. des Sciences pour 1772*, tom. ii. part i. p. 176.) The fifth is the account of Mr. Halhed, which has been already given. From this discrepancy, not only of the total numbers, but of many of the articles in the different accounts, it is manifest that our information concerning Indian chronology is hitherto as uncertain as the whole system of it is wild and fabulous. To me it appears highly probable, that when we understand more thoroughly the principles upon which the fictitious æras or Jogues of the Hindoos have been formed, we may be more able to reconcile their chronology to the true mode of computing time, founded on the authority of the Old Testament ; and may likewise find reason to conclude, that the account given by their astronomers of the situation of the heavenly bodies at the beginning of the *Collee Jogue*, is not established by actual observation, but the result of a retrospective calculation."

JOHN (St.), the BAPTIST, the fore-runner of Jesus Christ, was the son of Zacharias and Elizabeth. He retired into a desert, where he lived on locusts and wild honey ; and about the year 29 began to preach repentance, and to declare the coming of the Messiah. He baptized his disciples, and the following year Christ himself was baptized by him in the river Jordan. Some time after, having reprov'd Herod Antipas, who had a criminal correspondence with Herodias his brother Philip's wife, he was cast into prison, where he was beheaded. His head was brought to Herodias ; who, according to St. Jerome, pierced his tongue with the bodkin she used to fasten up her hair, to revenge herself after his death for the freedom of his reproofs.

JOHN (St.), the apostle, or the evangelist, was the brother of St. James the Great, and the son of Zebedee. He quitted the business of fishing to follow Jesus, and was his beloved disciple. He was witness to the actions and miracles of his Master ; was present at his transfiguration on mount Tabor ; and was with him in the garden of Olives. He was the only apostle who followed him to the cross ; and to him Jesus left the care of his mother. He was also the first apostle who knew him again after his resurrection. He preached the faith in Asia ; and principally resided at Ephesus, where he maintained the mother of our Lord. He is said to have founded the churches of Smyrna, Pergamus, Thyatira, Sardis, Philadelphia, and Laodicea. He is also said to have preached the gospel amongst the Parthians, and to have addressed his first epistle to that people. It is related, that, when at Rome, the emperor Domitian caused him to be thrown into a cauldron of boiling oil, when he came out unhurt ; on which he was banished to the isle of Patmos, where he wrote his Apocalypse. After the death of Domitian, he returned to Ephesus, where he composed his Gospel, about the year 96 ; and died there, in the reign of Trajan, about the year 100, aged 94.

Gospel of St. JOHN, a canonical book of the New Testament, containing a recital of the life, actions, doctrine, and death, of our Saviour Jesus Christ, written by St. John the apostle and evangelist. St. John wrote his Gospel at Ephesus, after his return from the isle of Patmos, at the desire of the Christians of Asia. St. Jerome says, he would not undertake it, but on condition that they should appoint a public fast to implore the assistance of God ; and that, the fast being ended, St. John, filled with the Holy Ghost, broke out into these words, " In the beginning was the Word," &c. The ancients assign two reasons for this undertaking : The first is, because, in the other three Gospels, there was wanting the history of the beginning

of Jesus Christ's preaching, till the imprisonment of John the Baptist, which therefore he applied himself particularly to relate. The second reason was, in order to remove the errors of the Cerinthians, Ebionites, and other sects. But Mr. Lampe and Dr. Lardner have urged several reasons to show that St. John did not write against Cerinthus or any other heretics in his Gospel.

Revelation of St. JOHN. See APOCALYPSE.

JOHN of Salisbury, bishop of Chartres in France, was born at Salisbury in Wiltshire, in the beginning of the 12th century. Where he imbibed the rudiments of his education, is unknown; but we learn that in the year 1136, being then a youth, he was sent to Paris, where he studied under several eminent professors, and acquired considerable fame for his application and proficiency in rhetoric, poetry, divinity, and particularly in the learned languages. Thence he travelled to Italy; and, during his residence at Rome, was in high favour with pope Eugenio III. and his successor Adrian IV. After his return to England he became the intimate friend and companion of the famous Thomas BECKET, archbishop of Canterbury, whom he attended in his exile, and is said to have been present when that haughty prelate was murdered in his cathedral. What preferment he had in the church during this time, does not appear; but in 1176 he was promoted by king Henry II. to the bishopric of Chartres in France, where he died in 1182. This John of Salisbury was really a phænomenon. He was one of the first restorers of the Greek and Latin languages in Europe; a classical scholar, a philosopher, a learned divine, and an elegant Latin poet. He wrote several books; the principal of which are, his life of St. Thomas of Canterbury, a collection of letters, and Polycraticon.

Pope JOHN XXII. a native of Cahors, before called *James d'Este*, was well skilled in the civil and canon law; and was elected pope after the death of Clement V. on the 7th of August 1316. He published the constitutions called *Clementines*, which were made by his predecessor; and drew up the other constitutions called *Extravagantes*. Lewis of Bavaria being elected emperor, John XXII. opposed him in favour of his competitor; which made much noise, and was attended with fatal consequences. That prince, in 1329, caused the antipope Peter de Corbiero, a Cordelier, to be elected, who took the name of Nicholas V. and was supported by Michael de Ceseune, general of his order; but that antipope was the following year taken and carried to Avignon, where he begged pardon of the pope with a rope about his neck, and died in prison two or three years after. Under this pope arose the famous question among the Cordeliers, called *the bread of the Cordeliers*; which was, Whether those monks had the property of the things given them, at the time they were making use of them? for example, Whether the bread belonged to them when they were eating it, or to the pope, or to the Roman church? This frivolous question gave great employment to the pope; as well as those which turned upon the colour, form, and stuff, of their habits, whether they ought to be white, grey, or black; whether the cowl ought to be pointed or round, large or small; whether their robes ought to be full, short, or long; of cloth, or of serge, &c. The disputes on all these minute trifles were carried so far between the Minor Brothers, that some of them were burned upon the occasion. He died at Avignon in 1334, aged 90.

JOHN of Gaunt, duke of Lancaster, a renowned general, father of Henry IV. king of England, died in 1438.

JOHN Sobieski of Poland, one of the greatest warriors in the 17th century, was, in 1665, made grand-marshal of the crown; and, in 1667, grand-general of the kingdom. His victories obtained over the Tartars and the Turks procured him the crown, to which he was elected in 1674. He was an encourager

of arts and sciences, and the protector of learned men. He died in 1696, aged 72.

St. JOHN'S Day, the name of two Christian festivals; one observed on June 24th, kept in commemoration of the wonderful circumstances attending the birth of John the Baptist; and the other on December 27th, in honour of St. John the Evangelist.

St. JOHN'S Wort. See HYPERICUM.

St. JOHN'S, an island of the East-Indies, and one of the Philippines, east of Mindanayo, from which it is separated by a narrow strait. E. lon. 125. 25. N. lat. 7. 0.

St. JOHN'S, an island of North-America, in the bay of St. Lawrence, having New-Scotland on the south and west, and Cape Breton on the east. The British got possession of it when Louisbourg was surrendered to them, on July 26, 1758.

JOHNSON or *JONSON* (BEN), one of the most considerable dramatic poets of the last age, whether from the number or merit of his productions. He was born at Westminster in 1574, and was educated at the public school there under the great Camden. He was descended from a Scottish family; and his father, who lost his estate under queen Mary, dying before our poet was born, and his mother marrying a bricklayer for her second husband, Ben was taken from school to work at his father-in-law's trade. Not being captivated with this employment, he went into the Low Countries, and distinguished himself in a military capacity. On his return to England, he entered himself at St. John's college, Cambridge; and having killed a person in a duel, was condemned, and narrowly escaped execution. After this he turned actor; and Shakespeare is said to have first introduced him to the world, by recommending a play of his to the stage, after it had been rejected. His Alchymist gained him such reputation, that in 1619 he was, at the death of Mr. Daniel, made poet-laureat to king James I. and master of arts at Oxford. As we do not find Jonson's æconomical virtues any where recorded, it is the less to be wondered at, that after this we find him petitioning king Charles, on his accession, to enlarge his father's allowance of 100 merks into pounds; and quickly after we learn, that he was very poor and sick, lodging in an obscure alley; on which occasion it was that Charles, being prevailed on in his favour, sent him ten guineas; which Ben receiving, said, "His majesty has sent me ten guineas, because I am poor and live in an alley; go and tell him, that his soul lives in an alley." He died in August 1637, aged 63 years, and was buried in Westminster-Abbey.—The most complete edition of his works was printed in 1756, in 7 vols. 8vo.

JOHNSON (Samuel), an English divine, remarkable for his learning, and steadiness in suffering for the principles of the Revolution in 1688. He was born in 1649; and, entering into orders, obtained in 1670 the rectory of Corringham in the hundreds of Essex, worth no more than 80 l. a year; which was the only church-preferment he ever had. In 1685, for having printed and dispersed *An humble and hearty address to all the Protestants in the present army*, he was fined 500 merks, degraded from the priesthood, stood twice in the pillory, and was whipped from Newgate to Tyburn. It happened luckily, that, in the degradation, they omitted to strip him of his cassock; which circumstance, slight as it may appear, rendered his degradation imperfect, and afterwards preserved his living to him. On the Revolution, the parliament resolved the proceedings against him to be null and illegal; and recommended him to the king, who offered him the rich deanery of Durham: but this he refused, as inadequate to his services and sufferings, which he thought to merit a bishopric. The truth was, he was passionate, self opinionated, and turbulent: and though, through Dr. Tillotson's means, he obtained a pension of 300 l. a-year, with other gratifications, he remained discontented;

pouring forth all his uneasiness against a standing army and the great favours shown to the Dutch. He died in 1703, and his works were afterwards collected in one volume folio.

JOHNSON (Dr. Samuel), who has been styled the brightest ornament of the 18th century, was born in the city of Litchfield in Staffordshire on the 18th of September N. S. 1709. His father Michael was a bookseller; and must have had some reputation in the city, as he more than once bore the office of chief magistrate. By what casuistical reasoning he reconciled his conscience to the oaths required to be taken by all who occupy such stations, cannot now be known; but it is certain that he was zealously attached to the exiled family, and instilled the same principles into the youthful mind of his son. So much was he in earnest in this work, and at so early a period did he commence it, that when Dr. Sacheverel, in his memorable tour through England, came to Litchfield, Mr. Johnson carried his son, not then quite three years old, to the cathedral, and placed him on his shoulders, that he might see as well as hear the far-famed preacher.

But political prejudices were not the only bad things which young Sam inherited from his father: he derived from the same source a morbid melancholy, which, though it neither depressed his imagination nor clouded his perspicacity, filled him with dreadful apprehensions of insanity, and rendered him wretched through life. From his nurse he contracted the *scrophula* or king's evil, which made its appearance at a very early period, disfigured a face naturally well-formed, and deprived him of the sight of one of his eyes.

When arrived at a proper age for grammatical instruction, he was placed in the free school of Litchfield, of which one Mr. Hunter was then master; a man whom his illustrious pupil thought "very severe, and wrong-headedly severe," because he would beat a boy for not answering questions which he could not expect to be asked. He was, however, a skilful teacher; and Johnson, when he stood in the very front of learning, was sensible how much he owed to him; for, upon being asked how he had acquired so accurate a knowledge of the Latin tongue, he replied, "My master beat me very well; without that, Sir, I should have done nothing."

At the age of 15 Johnson was removed from Litchfield to the school of Stourbridge in Worcestershire, at which he remained little more than a year, and then returned home, where he staid two years without any settled plan of life or any regular course of study. He read, however, a great deal in a desultory manner, as chance threw books in his way, and as inclination directed him through them; so that, when in his 19th year he was entered a commoner of Pembroke college, Oxford, his mind was stored with a variety of such knowledge as is not often acquired in universities, where boys seldom read any books but what are put into their hands by their tutors. He had given very early proofs of his poetical genius both in his school exercises and in other occasional compositions: but what is perhaps more remarkable, as it shows that he must have thought much on a subject on which other boys of that age seldom think at all, he had before he was 14 entertained doubts of the truth of revelation. From the melancholy of his temper these would naturally prey upon his spirits, and give him great uneasiness: but they were happily removed by a proper course of reading; for "his studies, being honest, ended in conviction. He found that religion is true, and what he had learned, he ever afterward endeavoured to teach."

Concerning his residence in the university, and the means by which he was there supported, his two principal biographers contradict each other; so that these are points of which we cannot write with certainty. According to Sir John Hawkins, the time of his continuance at Oxford is divisible into two periods: Mr. Boswell represents it as only one period, with the

usual interval of a long vacation. Sir John says, that he was supported at college by Mr. Andrew Corbet in quality of assistant in the studies of his son: Mr. Boswell assures us, that though he was promised pecuniary aid by Mr. Corbet, that promise was not in any degree fulfilled. We should be inclined to adopt the knight's account of this transaction, were it not palpably inconsistent with itself. He says, that the two young men were entered in Pembroke on the *same day*; that Corbet continued in the college two years; and yet that Johnson was driven home in little more than *one year*, because by the *removal* of Corbet he was deprived of his pension. A story, of which one part contradicts the other, cannot wholly be true. Sir John adds, that "meeting with another source, the bounty, as it is supposed, of some one or more of the members of the cathedral of Litchfield, he returned to college, and made up the whole of his residence in the university about three years." Mr. Boswell has told us nothing, but that Johnson, though his father was unable to support him, continued three years in college, and was then driven from it by extreme poverty.

These gentlemen differ likewise in their accounts of Johnson's tutors. Sir John Hawkins says that he had two, Mr. Jordan and Dr. Adams. Mr. Boswell affirms that Dr. Adams *could not* be his tutor, *because* Jordan did not quit the college till 1731; the year in the autumn of which Johnson himself was compelled to leave Oxford. Yet the same author represents Dr. Adams as saying, "I was Johnson's *nominal* tutor, but he was above my mark;" a speech of which it is not easy to discover the meaning, if it was not Johnson's duty to attend Adams's lectures. In most colleges we believe there are two tutors in different departments of education; and therefore it is not improbable that Jordan and Adams may have been tutors to Johnson at the same time, the one in languages, the other in science. Jordan was a man of such mean abilities, that, though his pupil loved him for the goodness of his heart, he would often risk the payment of a small fine rather than attend his lectures; nor was he studious to conceal the reason of his absence. Upon occasion of one such imposition, he said, "Sir, you have scondced me two-pence for non-attendance at a lecture not worth a penny." For some transgression or absence his tutor imposed upon him as a Christmas exercise the task of translating into Latin verse Pope's *Messiah*; which being shown to the author of the original, was read and returned with this encomium, "The writer of this poem will leave it a question for posterity, whether his or mine be the original." The particular course of his reading while in college and during the vacation which he passed at home, cannot be traced. That at this period he read much, we have his own evidence in what he afterwards told the king; but his mode of study was never regular, and at all times he thought more than he read. He informed Mr. Boswell, that what he read *solidly* at Oxford was Greek, and that the study of which he was most fond was metaphysics.

It was in the year 1731 that Johnson left the university without a degree; and as his father, who died in the month of December of that year, had suffered great misfortunes in trade, he was driven out a commoner of nature, and excluded from the regular modes of profit and prosperity. Having therefore not only a profession but the means of subsistence to seek, he accepted, in the month of March 1732, an invitation to the office of under-master of a free school at Market Bosworth in Leicestershire: but not knowing, as he said, whether it was more disagreeable for him to teach or for the boys to learn the grammar-rules, and being likewise disgusted at the treatment which he received from the patron of the school, he relinquished in a few months a situation which he ever afterwards recollected with horror. Being thus again without any fixed employment, and with very little money in his pocket, he translated Lobo's Voyage to Abyssinia, for the trifling sum, it is

said, of five guineas, which he received from a bookseller in Birmingham. This was the first attempt which it is certain he made to procure pecuniary assistance by means of his pen; and it must have held forth very little encouragement to his commencing author by profession.

In 1735, being then in his 26th year, he married Mrs. Porter, the widow of a mercer in Birmingham; whose age was almost double his; whose external form, according to Garrick and others, had never been captivating; and whose fortune amounted to hardly 800*l*. That she had a superiority of understanding and talents is extremely probable, both because she certainly inspired him with a more than ordinary passion, and because she was herself so delighted with the charms of his conversation as to overlook his external disadvantages, which were many and great. He now set up a private academy; for which purpose he hired a large house well situated near his native city: but his name having then nothing of that celebrity which afterwards commanded the attention and respect of mankind, this undertaking did not succeed. The only pupils who are known to have been placed under his care, were the celebrated David Garrick, his brother George Garrick, and a young gentleman of fortune whose name was Offely. He kept his academy only a year and a half; and it was during that time that he constructed the plan and wrote a great part of his tragedy of Irene.

The respectable character of his parents and his own merit had secured him a kind reception in the best families at Litchfield; and he was particularly distinguished by Mr. Walmisley, register of the ecclesiastical court, a man of great worth and of very extensive and various erudition. That gentleman, upon hearing part of Irene read, thought so highly of Johnson's abilities as a dramatic writer, that he advised him by all means to finish the tragedy and produce it on the stage. To men of genius the stage holds forth temptations almost irresistible. The profits arising from a tragedy, including the representation and printing of it, and the connections which it sometimes enables the author to form, were in Johnson's imagination inestimable. Flattered, it may be supposed, with these hopes, he set out some time in the year 1737 with his pupil David Garrick for London, leaving Mrs. Johnson to take care of the house and the wreck of her fortune. The two adventurers carried with them from Mr. Walmisley an earnest recommendation to the reverend Mr. Colson, then master of an academy, and afterwards Lucasian professor of mathematics in the university of Cambridge; but from that gentleman it does not appear that Johnson found either protection or encouragement.

How he spent his time upon his first going to London is not particularly known. His tragedy was refused by the managers of that day; and for some years the Gentleman's Magazine seems to have been his principal resource for employment and support. To enumerate his various communications to that far-samed miscellany, would extend this article beyond the limits which we can afford. Suffice it to say, that his connection with Cave the proprietor became very close; that he wrote prefaces, essays, reviews of books, and poems; and that he was occasionally employed in correcting the papers written by other correspondents. When complaints of the nation against the administration of Sir Robert Walpole became loud, and a motion was made, February 13th, 1740-1, to remove him from his majesty's councils for ever, Johnson was pitched upon by Cave to write what was in the Magazine entitled *Debates in the Senate of Lilliput*, but was understood to be the speeches of the most eminent members in both houses of parliament. These orations, which induced *Voltaire* to compare British with ancient eloquence, were hastily sketched by Johnson while he was not yet 32 years old, while he was little acquainted with life, while he was struggling not for distinction but for existence. Perhaps

in none of his writings has he given a more conspicuous proof of a mind prompt and vigorous almost beyond conception: for they were composed from scanty notes taken by illiterate persons employed to attend in both houses; and sometimes he had nothing communicated to him but the names of the several speakers, and the part which they took in the debate.

His separate publications which at this time attracted the greatest notice were, "*London*, a Poem in imitation of Juvenal's third Satire;" "*Marmor Norfolkense*, or an Essay on an ancient prophetic Inscription in Monkish Rhyme, lately discovered near Lynne in Norfolk;" and "*A complete Vindication of the Licensers of the Stage from the malicious and scandalous aspersions of Mr. Brook author of Gustavus Vasa.*" The poem which was published in 1738 by Doddsley, is universally known and admired as the most spirited instance in the English language of ancient sentiments adapted to modern topics. Pope, who then filled the poetical throne without a rival, being informed that the author's name was *Johnson*, and that he was an obscure person, replied, "he will soon be *deterred*." The other two pamphlets, which were published in 1739, are filled with keen satire on the government: and though Sir John Hawkins has thought fit to declare that they display neither learning nor wit, Pope was of a different opinion; for, in a note of his preserved by Mr. Boswell, he says, that "the whole of the Norfolk prophecy is very humorous."

Mrs. Johnson, who went to London soon after her husband, now lived sometimes in one place and sometimes in another, sometimes in the city and sometimes at Greenwich: but Johnson himself was oftener to be found at St. John's Gate, where the Gentleman's Magazine was published, than in his own lodgings. It was there that he became acquainted with *Savage*, with whom he was induced, probably by the similarity of their circumstances, to contract a very close friendship; and such were their extreme necessities, that they have often wandered whole nights in the street for want of money to procure them a lodging. In one of these nocturnal rambles, when their distress was almost incredible, so far were they from being depressed by their situation, that, in high spirits and brimful of patriotism, they traversed St. James's Square for several hours, inveighed against the minister; and, as Johnson said in ridicule of himself, his companion, and all such patriots, "resolved that *they* would stand by their country!" In 1744 he published the life of his unfortunate companion; a work which, had he never written any thing else, would have placed him very high in the rank of authors. His narrative is remarkably smooth and well disposed, his observations are just, and his reflections disclose the inmost recesses of the human heart.

In 1749, when Drury-lane theatre was opened under the management of Garrick, Johnson wrote a prologue for the occasion; which for just dramatic criticism on the whole range of the English stage, as well as for poetical excellence, is confessedly unrivalled. But this year is, in his life, distinguished as the epoch when his arduous and important work, the Dictionary of the English Language, was announced to the world by the publication of its plan or prospectus, addressed to the earl of Chesterfield. From that nobleman Johnson was certainly led to expect patronage and encouragement; and it seems to be equally certain that his lordship expected, when the book should be published, to be honoured with the dedication. The expectations of both were disappointed. Lord Chesterfield, after seeing the lexicographer once or twice, suffered him to be repulsed from his door: but afterwards thinking to conciliate him when the work was upon the eve of publication, he wrote two papers in "*The World*," warmly recommending it to the public. This artifice was seen through; and Johnson, in very polite language, rejected his Lordship's advances, letting him know, that he was unwilling the public should consider him as owing to a patron

that which Providence had enabled him to do for himself. This great and laborious work its author expected to complete in three years: but he was certainly employed upon it seven; for we know that it was begun in 1747, and the last sheet was sent to the press in the end of the year 1754. When we consider the nature of the undertaking, it is indeed astonishing that it was finished so soon, since it was written, as he says, "with little assistance of the learned, and without any patronage of the great; not in the soft obscurities of retirement, or under the shelter of academic bowers, but amidst inconvenience and distraction, in sickness and in sorrow." The sorrow, to which he here alludes, is probably that which he felt for the loss of his wife, who died on the 17th of March O. S. 1752, and whom he continued to lament as long as he lived.

The Dictionary did not occupy his whole time: for while he was pushing it forward, he fitted his tragedy for the stage; wrote the lives of several eminent men for the Gentleman's Magazine; published an Imitation of the 10th Satire of Juvenal, entitled "The Vanity of human Wishes;" and began and finished "The Rambler." This last work is so well known, that it is hardly necessary to say that it was a periodical paper, published twice a-week, from the 20th of March 1750 to the 14th of March 1752 inclusive: but to give our readers some notion of the vigour and promptitude of the author's mind, it may not be improper to observe, that, notwithstanding the severity of his other labours, all the assistance which he received does not amount to five papers; and that many of the most masterly of those unequalled essays were written on the spur of the occasion, and never seen entire by the author till they returned to him from the press.

Soon after the Rambler was concluded, Dr. Hawkesworth projected "The Adventurer" upon a similar plan; and by the assistance of friends he was enabled to carry it on with almost equal merit. For a short time, indeed, it was the most popular work of the two; and the papers with the signature T, which are confessedly the most splendid in the whole collection, are now known to have been communicated by Johnson, who received for each the sum of two guineas. This was double the price for which he sold sermons to such clergymen as either would not or could not compose their own discourses; and of sermon-writing he seems to have made a kind of trade.

Though he had exhausted, during the time that he was employed on the Dictionary, more than the sum for which the booksellers had bargained for the copy; yet by means of the Rambler, Adventurer, sermons, and other productions of his pen, he now found himself in greater affluence than he had ever been before; and as the powers of his mind, distended by long and severe exercise, required relaxation to restore them to their proper tone, he appears to have done little or nothing from the closing of the Adventurer till the year 1756, when he submitted to the office of reviewer in the Literary Magazine. Of his reviews by far the most valuable is that of Soame Jenyns's "Free Inquiry into the Nature and Origin of Evil." Never were wit and metaphysical acuteness more closely united than in that criticism, which exposes the weakness and holds up to contempt the reasonings of those vain mortals, who presumptuously attempt to grasp the scale of existence, and to form plans of conduct for the Creator of the universe. But the furnishing of magazines, reviews, and even newspapers, with literary intelligence, and authors of books with dedications and prefaces, was considered as an employment unworthy of Johnson. It was therefore proposed by the booksellers that he should give a new edition of the dramas of Shakespeare; a work which he had projected many years before, and of which he had published a specimen which was commended by Warburton. When one of his friends expressed a hope that this employment would furnish him with amusement and add to his fame, he replied,

"I look upon it as I did upon the Dictionary; it is all work; and my inducement to it is not love or desire of fame, but the want of money, which is the only motive to writing that I know of." He issued proposals, however, of considerable length; in which he showed that he knew perfectly what a variety of research such an undertaking required: but his indolence prevented him from pursuing it with diligence, and it was not published till many years afterwards.

On the 15th of April 1758 he began a new periodical paper entitled "The Idler," which came out every Saturday in a weekly newspaper, called "The Universal Chronicle, or Weekly Gazette," published by Newbery. Of these Essays, which were continued till the 5th of April 1760, many were written as hastily as an ordinary letter; and one in particular composed at Oxford was begun only half an hour before the departure of the post which carried it to London. About this time he had the offer of a living, of which he might have rendered himself capable by entering into orders. It was a rectory in a pleasant country, of such yearly value as would have been an object to one in much better circumstances; but sensible, as it is supposed, of the asperity of his temper, he declined it, saying, "I have not the requisites for the office, and I cannot in my conscience shear the flock which I am unable to feed."

In the month of January 1750 his mother died at the great age of 90; an event which deeply affected him, and gave birth to the 41st Idler, in which he laments, that "the life which made his own life pleasant was at an end, and that the gate of death was shut upon his prospects." Soon afterwards he wrote his "Rasselas Prince of Abyssinia;" that with the profits he might defray the expence of his mother's funeral, and pay some debts which she had left. He told a friend, that he received for the copy 100l. and 25l. more when it came to a second edition; that he wrote it in the evenings of one week, sent it to the press in portions as it was written, and had never since read it over.

Hitherto, notwithstanding his various publications, he was poor, and obliged to provide by his labour for the wants of the day that was passing over him; but having been early in 1762 represented to the king as a very learned and good man without any certain provision, his majesty was pleased to grant him a pension, which Lord Bute, then first minister, assured him "was not given for any thing which he *was to do*, but for what he *had already done*." A fixed annuity of three hundred pounds a year, if it diminished his distress, increased his indolence; for, as he constantly avowed that he had no other motive for writing than to gain money, as he had now what was abundantly sufficient for all his purposes, as he delighted in conversation, and was visited and admired by the witty, the elegant, and the learned, very little of his time was passed in solitary study. Solitude was indeed his aversion; and that he might avoid it as much as possible, Sir Joshua Reynolds and he, in 1764, instituted a club, which existed long without a name, but was afterwards known by the title of the *Literary Club*. It consisted of some of the most enlightened men of the age, who met at the Turk's Head in Gerard-street, Soho, one evening in every week at seven, and till a late hour enjoyed "the feast of reason and the flow of soul."

In 1765, when Johnson was more than usually oppressed with constitutional melancholy, he was fortunately introduced into the family of Mr. Thrale, one of the most eminent brewers in England, and member of parliament for the borough of Southwark: and it is but justice to acknowledge, that to the assistance which Mr. and Mrs. Thrale gave him, to the shelter which their house afforded him for 16 or 17 years, and to the pains which they took to soothe or repress his uneasy fancies, the public is probably indebted for some of the most masterly as

well as most popular works which he ever produced. At length, in the October of this year, he gave to the world his edition of Shakespeare, which is chiefly valuable for the preface, where the excellencies and defects of that immortal bard are displayed with such judgment, as must please every man whose taste is not regulated by the standard of fashion or national prejudice. In 1767 he was honoured by a private conversation with the king in the library at the queen's house: and two years afterwards, upon the establishment of the royal academy of painting, sculpture, &c. he was nominated professor of ancient literature; an office merely honorary, and conferred on him, as is supposed, at the recommendation of his friend the president.

In the variety of subjects on which he had hitherto exercised his pen, he had forborne, since the administration of Sir Robert Walpole, to meddle with the disputes of contending factions; but having seen with indignation the methods which, in the business of Mr. Wilkes, were taken to work upon the populace, he published in 1770 a pamphlet entitled "The False Alarm;" in which he asserts, and labours to prove by a variety of arguments founded on precedents, that the expulsion of a member of the house of commons is equivalent to exclusion, and that no such calamity as the subversion of the constitution was to be feared from an act warranted by usage, which is the law of parliament. Whatever may be thought of the principles maintained in this publication, it unquestionably contains much wit and much argument, expressed in the author's best style of composition; and yet it is known to have been written between eight o'clock on Wednesday night and twelve o'clock on the Thursday night, when it was read to Mr. Thrale upon his coming from the house of commons. In 1771 he published another political pamphlet, entitled, "Thoughts on the late transactions respecting Falkland's Islands;" in which he attacked *Junius*: and he ever afterwards delighted himself with the thought of having destroyed that able writer, whom he certainly surpassed in nervous language and pointed ridicule.

In 1773 he visited with Mr. Boswell some of the most considerable of the Hebrides or Western Islands of Scotland, and published an account of his journey in a volume which abounds in extensive philosophical views of society, ingenious sentiments, and lively description, but which offended many persons by the violent attack which it made on the authenticity of the poems attributed to Ossian. For the degree of offence that was taken, the book can hardly be thought to contain a sufficient reason; if the antiquity of these poems be yet doubted, it is owing more to the conduct of their editor than to the violence of Johnson. In 1774, the parliament being dissolved, he addressed to the electors of Great Britain a pamphlet, entitled "The Patriot;" of which the design was to guard them from imposition, and teach them to distinguish true from false patriotism. In 1775, he published "Taxation no tyranny; in answer to the resolutions and address of the American Congress." In this performance his admirer, Mr. Boswell, cannot, he says, perceive that ability of argument or that felicity of expression for which on other occasions Johnson was so eminent. This is a singular criticism. To the assumed principle upon which the reasoning of the pamphlet rests many have objected, and perhaps their objections are well founded; but if it be admitted that "the supreme power of every community has the right of requiring from all its subjects such contributions as are necessary to the public safety or public prosperity," it will be found a very difficult task to break the chain of arguments by which it is proved that the British parliament had a right to tax the Americans. As to the *expression* of the pamphlet, the reader, who adopts the maxim recorded in the "Journal of a tour to the Hebrides," that a controvertist "ought not to strike soft in battle," must acknowledge that it is uncommonly happy, and that the whole

performance is one of the most brilliant as well as most correct pieces of composition that ever fell from the pen of its author. These essays drew upon him numerous attacks, all of which he heartily despised; for though it has been supposed that "A letter addressed to Dr. Samuel Johnson, occasioned by his political publications," gave him great uneasiness, the contrary is manifest, from his having, after the appearance of that letter, collected them into a volume with the title of "Political Tracts by the author of the Rambler." In 1765 Trinity College, Dublin, had created him LL.D. by *diploma*, and he now received the same honour from the university of Oxford; an honour with which, though he did not boast of it, he was highly gratified. In 1777 he was induced, by a case of a very extraordinary nature, to exercise that humanity which in him was obedient to every call. Dr. William Dodd, a clergyman under sentence of death for the crime of forgery, found means to interest Johnson in his behalf, and procured from him two of the most energetic compositions of the kind ever seen; the one a petition from himself to the king, the other a like address from his wife to the queen. These petitions failed of success.

The principal booksellers in London having determined to publish a body of English poetry, Johnson was prevailed upon to write the lives of the poets, and give a character of the works of each. This task he undertook with alacrity, and executed it in such a manner as must convince every competent reader, that as a biographer and a critic no nation can produce his equal. The work was published in ten small volumes, of which the first four came abroad in 1778, and the others in 1781. While the world in general was filled with admiration of the stupendous powers of that man, who at the age of seventy-two, and labouring under a complication of diseases, could produce a work which displays so much genius and so much learning; there were narrow circles in which prejudice and resentment were fostered, and whence attacks of different sorts issued against him. These gave him not the smallest disturbance. When told of the feeble, though shrill, outcry that had been raised, he said—"Sir, I considered myself as entrusted with a certain portion of truth. I have given my opinion sincerely; let them show where they think me wrong."

He had hardly begun to reap the laurels gained by this performance, when death deprived him of Mr. Thrale, in whose house he had enjoyed the most comfortable hours of his life; but it abated not in Johnson that care for the interests of those whom his friend had left behind him, which he thought himself bound to cherish, both in duty as one of the executors of his will, and from the nobler principle of gratitude. On this account, his visits to Streatham, Mr. Thrale's villa, were for some time after his death regularly made on Monday and protracted till Saturday, as they had been during his life; but they soon became less and less frequent, and he studiously avoided the mention of the place or the family. Mrs. Thrale, now Piozzi, says indeed, that "it grew extremely perplexing and difficult to live in the house with him when the master of it was no more; because his dislikes grew capricious, and he could scarce bear to have any body come to the house whom it was absolutely necessary for her to see." The person whom she thought it most necessary for her to see may perhaps be guessed at without any superior share of sagacity; and if these were the visits which Johnson could not bear, we are so far from thinking his dislikes capricious, though they may have been perplexing, that, if he had acted otherwise, we should have blamed him for want of gratitude to the friend whose "face for fifteen years had never been turned upon him but with respect or benignity."

About the middle of June 1783, his constitution sustained a feverish shock than it had ever before felt, by a stroke of the palsy; so sudden and so violent, that it awakened him out of a sound sleep, and rendered him for a short time speechless.

As usual, his recourse under this affliction was to piety, which in him was constant, sincere, and fervent. He tried to repeat the Lord's prayer first in English, then in Latin, and afterwards in Greek; but succeeded only in the last attempt; immediately after which he was again deprived of the power of articulation. From this alarming attack he recovered with wonderful quickness, but it left behind it some presages of an hydropic affection; and he was soon afterwards seized with a spasmodic asthma of such violence that he was confined to the house in great pain, while his dropsy increased notwithstanding all the efforts of the most eminent physicians in London and Edinburgh. He had, however, such an interval of ease as enabled him in the summer of 1784 to visit his friends at Oxford, Litchfield, and Ashbourne in Derbyshire. The Romish religion being introduced one day as the topic of conversation when he was at the house of Dr. Adams, Johnson said, "If you join the papists externally, they will not interrogate you strictly as to your belief in their tenets. No reasoning papist believes every article of their faith. There is one side on which a good man might be persuaded to embrace it. A good man of a timorous disposition, in great doubt of his acceptance with God, and pretty credulous, might be glad of a church where there are so many helps to go to heaven. I would be a papist if I could. I have fear enough; but an obstinate rationality prevents me. I shall never be a papist unless on the near approach of death, of which I have very great terror."

His constant dread of death was indeed so great, that it astonished all who had access to know the piety of his mind and the virtues of his life. Attempts have been made to account for it in various ways; but doubtless that is the true account which is given in the *Olla Podrida*, by an elegant and pious writer, who now adorns a high station in the church of England. "That he should not be conscious of the abilities with which Providence had blessed him, was impossible. He felt his own powers; he felt what he was capable of having performed; and he saw how little, comparatively speaking, he had performed. Hence his apprehension on the near prospect of the account to be made, viewed through the medium of constitutional and morbid melancholy, which often excluded from his sight the bright beams of divine mercy." This, however, was the case only while death was approaching from some distance. From the time he was certain it was near, all his fears were calmed. He died on the 13th of Dec. 1784, and in St. Paul's Cathedral a statue has lately been erected to his memory.

A just character of this great man would carry us far beyond our limits; we must therefore be somewhat concise in the following sketch. His stature was tall, his limbs were large, his strength was more than common, and his activity in early life had been greater than such a form gave reason to expect: but he was subject to an infirmity of the convulsive kind, resembling the distemper called St. Vitus's dance; and he had the seeds of so many diseases sown in his constitution, that a short time before his death he declared that he hardly remembered to have passed one day wholly free from pain. He possessed very extraordinary powers of understanding; which were much cultivated by reading, and still more by meditation and reflection. His memory was remarkably retentive, his imagination uncommonly vigorous, and his judgment keen and penetrating. He read with great rapidity, retained with wonderful exactness what he so easily collected, and possessed the power of reducing to order and system the scattered hints on any subject which he had gathered from different books. It would not perhaps be safe to claim for him the highest place, among his contemporaries, in any single department of literature; but, to use one of his own expressions, he brought more *mind* to every subject, and had a greater variety of knowledge *ready* for all occasions, than any other man that could be easily named. Though prone to

superstition, he was in all other respects so remarkably incredulous, that Hogarth said, while Johnson firmly believed the bible, he seemed determined to believe nothing but the bible. Of the importance of religion he had a strong sense, and his zeal for its interests were always awake, so that profaneness of every kind was abashed in his presence. The same energy which was displayed in his literary productions, was exhibited also in his conversation, which was various, striking, and instructive: like the sage in *Rasselas*, he spoke, and attention watched his lips; he reasoned, and conviction closed his periods: when he pleased, he could be the greatest sophist that ever contended in the lists of declamation; and perhaps no man ever equalled him in nervous and pointed repartees. His veracity, from the most trivial to the most solemn occasions, was strict even to severity: he scorned to embellish a story with fictitious circumstances; for what is not a representation of reality, he used to say, is not worthy of our attention. As his purse and his house were ever open to the indigent, so was his heart tender to those who wanted relief, and his soul was susceptible of gratitude and every kind impression. He had a roughness in his manner which subdued the saucy and terrified the meek: but it was *only* in his *manner*; for no man was more loved than Johnson was by those who knew him; and his works will be read with veneration for their author as long as the language in which they are written shall be understood.

JOHNSONIA, *callicarpa*, in botany, a genus of the *tetrandria monogynia* class. Its characters are these: the flower has an empalement of one leaf, cut at the brim into four short segments: it has one tubulous petal, divided into four parts at the brim, and four slender stamina, which are longer than the petal. In the centre is situated a roundish germen, which afterwards becomes a smooth globular berry, inclosing four hard oblong seeds. Miller reckons only one species, a native of South Carolina; but Linnæus enumerates two. The leaves of the American plant were used by Dr. Dale in dropical cases with some degree of advantage.

JOIGNY, a town of France, in Champagne, and in the diocese of Sens, with a very handsome castle. It consists of three parishes, and is pleasantly situated on the river Yonne, in E. lon. 3. 25. N. lat. 47. 56.

JOINERY, the art of working in wood, or of fitting various pieces of timber together. It is called by the French *menuiserie*, "small work," to distinguish it from carpentry, which is employed about large and less curious works.

JOINT, in general, denotes the juncture of two or more things. The joints of the human body are called by anatomists *articulations*. See ANATOMY, p. 168. The suppleness to which the joints may be brought by long practice from the time of infancy, is very surprising. Every common posture-master shows us a great deal of this; but one of the most wonderful instances we ever had of it, was in a person of the name of *Clark*, and famous for it in London, where he was commonly known by the name of *Clark the posture-master*. This man had found the way, by long practice, to distort many of the bones, of which nobody before had ever thought it possible to alter the position. He had such an absolute command of his muscles and joints, that he could almost disjoint his whole body; so that he once imposed on the famous Mullens by his distortions, in such a manner, that he refused to undertake his cure: but, to the amazement of the physician, no sooner had he given over his patient, than he saw him restore himself to the figure and condition of a proper man, with no distortion about him.

JOINTURE, in law, generally signifies a settlement of lands and tenements, made on a woman in consideration of marriage.

JOINVILLE (JOHN SIRE de), an eminent French statesman of the 13th century, who was seneschal or high-steward of Champagne, and one of the principal lords in the court of

Lewis IX. He attended that monarch in all his expeditions; and had so much confidence placed in him, that all matters of justice in the palace were referred to his decision, and the king undertook nothing of consequence without consulting him. He wrote the history of St. Lewis in French, which is a very curious and interesting piece; and died about the year 1318. The best edition of this work is that of Du Cange, in folio, with learned remarks.

JOINVILLE, an ancient and considerable town of France, in Champagne, with the title of a principality, and a large magnificent castle. It is situated on the river Marne, in E. lon. 5. 10. N. lat. 48. 20.

JOISTS, or **JOYSTS**, in architecture, those pieces of timber framed into the girders and summers, on which the boards of the floor are laid. See **ARCHITECTURE**.

IOLAIA, a festival at Thebes, the same as that called **Heracleia**. It was instituted in honour of Hercules and his friend Iolas, who assisted him in conquering the Hydra. It continued during several days, on the first of which were offered solemn sacrifices. The next day horse-races and athletic exercises were exhibited. The following day was set apart for wrestling; the victors were crowned with garlands of myrtle generally used at funeral solemnities. They were sometimes rewarded with tripods of brass. The place where the exercises were exhibited was called Iolaion; where there were to be seen the monument of Amphitryon and the cenotaph of Iolas, who was buried in Sardinia. These monuments were strewed with garlands and flowers on the day of the festival.

IOLAS or **IOLAUS**, in fabulous history, a son of Iphiclus king of Thessaly, who assisted Hercules in conquering the Hydra, and burnt with a hot iron the place where the heads had been cut off, to prevent the growth of others. He was restored to his youth and vigour by Hebe, at the request of his friend Hercules. Some time afterwards Iolas assisted the **HERACLIDÆ** against Eurytheus, and killed the tyrant with his own hand. According to Plutarch, Iolas had a monument in Bœotia and Phocis, where lovers used to go and bind themselves by the most solemn oaths of fidelity, considering the place as sacred to love and friendship. According to Diodorus and Pausanias, Iolas died and was buried in Sardinia, where he had gone to make a settlement at the head of the sons of Hercules by the 50 daughters of Thespius.

JOLI, or **JOLY**, (**CLAUDIUS**), a worthy parish-priest, and an excellent scholar, descended from a family eminent for learning and piety; was born at Paris in 1607. He applied himself first to the law, and pleaded for some time at the bar: but inclining afterwards to the church, he entered into orders, and in 1631 obtained a canonry in the cathedral church of Notre Dame at Paris; the duties of which office he discharged with an exactness beyond all example as long as he lived. Discovering at the same time occasionally a capacity for state-affairs, the duke de Longueville, the French plenipotentiary for negotiating a general peace, took Joly with him to Munster, where he proved a good assistant. On his return, he resumed his former employments with his usual zeal. In 1671 he was made precentor in his church; and several times official of Paris, without his seeking; always behaving, as an ecclesiastical magistrate, with perfect integrity, and testifying a sincere love for justice. He died in 1700, and left many works; in which, as in as many mirrors, his true character fully appears.

JOLI (Guy), king's counsellor to the Chatelet, and syndic of the revenues of the Hotel de Ville at Paris, attached himself for a long time to cardinal de Retz in the capacity of secretary. Beside other tracts, he wrote *Memoirs* from 1648 to 1665, including those of Cardinal de Retz; a translation of which into English was published in 1755.

JOLLOXOCHITL, or **FLOWER OF THE HEART**, in ho-

tany; a large beautiful flower growing in Mexico; where it is not less esteemed for its beauty than for its odour, which is so powerful, that a single flower is sufficient to fill a whole house with the most pleasing fragrance. It has many petals, which are glutinous, externally white, internally reddish or yellowish, and disposed in such a manner, that when the flower is open and its petals are expanded, it has the appearance of a star; but when shut it resembles in some measure a heart, from whence its name arose. The tree which bears it is tolerably large, and its leaves are long and rough. See pl. 25.

ION, in fabulous history, a son of Xuthus and Creusa daughter of Erechtheus, who married Helice, the daughter of Selinus king of Ægiæ. He succeeded to the throne of his father-in-law; and built a city, which he called *Helice* on account of his wife. His subjects from him received the name of *Ionians*, and the country that of *Ionia*. See **IONIA**.

ION, a tragic poet of Chios, who flourished about the 82d Olympiad. His tragedies were represented at Athens, where they met with universal applause. He is mentioned and greatly recommended by Aristophanes and Athenæus, &c.

IONA. See **ICOLMKILL**.

JONAH, or *Prophecy of JONAH*, a canonical book of the Old Testament; in which it is related, that Jonah (about 771 B. C.) was ordered to go and prophesy the destruction of the Ninevites, on account of their wickedness. But the prophet, instead of obeying the divine command, embarked for Tarshish; when, a tempest arising, the mariners threw him into the sea: he was swallowed by a great fish; and, after being three days and nights in his belly, was cast upon the land. Hereupon being sensible of his past danger and surprising deliverance, he betook himself to the journey and embassy to which he was appointed; and arriving at Nineveh the metropolis of Assyria, he, according to his commission, boldly laid open their sins and miscarriages, and proclaimed their sudden overthrow: upon which the whole city, by prayer and fasting, and a speedy repentance, happily averted the divine vengeance, and escaped the threatened ruin. Jonah upon this, fearing to pass for a false prophet, retired to a hill at some distance from the city; where God, by a miracle, condescended to show him the unreasonableness of his discontent.

JONAS (**JUSTUS**), a Protestant divine, born at North Hausen, in Thuringia, in 1493. He was one of Luther's most zealous disciples. He contracted a strict friendship with Melancthon; became principal of the college of Wittenburg, and afterwards dean of the university of that city. He wrote a treatise in favour of the marriage of priests, and other works; and died in 1555.

JONAS (**ARNAGRIMUS**), a learned Icelandic, acquired great reputation by his skill in the sciences, and particularly in astronomy. He was the coadjutor to Gundeban de Thorlac, bishop of Holar, in Iceland. He refused that bishopric, after the death of Gundeban; and died in 1649. He wrote several works; the principal of which are, *Idea vera Magistratus*, and his history and description of Iceland.

JONATHAN, the son of Saul, celebrated in sacred history for his valour, and for his friendship for David against the interest of his own house. Slain in battle 1055 B. C.

JONATHAN Maccabeus, brother of Judas, a renowned general of the Jews. He forced Bacchides the Syrian general, who made war with the Jews, to accept a peace; conquered Demetrius Soter, and afterwards Apollonius, that prince's general; but, being ensnared by Tryphon, was put to death 144 B. C.

JONES (**INIGO**), a celebrated English architect, was the son of a cloth-worker of London, and was born in 1572. He was at first put apprentice to a joiner; but early distinguished himself by his inclination to drawing or designing, and was par-

particularly taken notice of for his skill in landscape-painting. This afterwards recommended him to the favour of William earl of Pembroke, who sent him abroad with a handsome allowance in order to perfect himself in that branch. He was no sooner at Rome, than he found himself in his proper sphere: he felt that nature had not formed him to decorate cabinets, but to design palaces. He dropt the pencil, and conceived Whitehall. In the state of Venice he saw the works of Palladio, and learned how beautifully taste may be exerted on a less theatre than the capital of an empire. How his abilities distinguished themselves in a spot where they certainly had no opportunity to act, we are not told, though it would not be the least curious part of his history; certain it is, that, on the strength of his reputation at Venice, Christian IV. invited him to Denmark, and appointed him his architect; but on what buildings he was employed in that country, we are yet to learn. James I. found him at Copenhagen, and queen Ann took him in the quality of her architect to Scotland. He served prince Henry in the same capacity, and the place of surveyor-general of the works was granted to him in reversion. On the death of that prince, with whom at least all his lamented qualities did not die, Jones travelled once more into Italy, and, assisted by ripeness of judgment, perfected his taste. To the interval between these voyages Mr. Walpole is inclined to assign those buildings of Inigo, which are less pure, and border too much upon the bastard style, which one may call *king James's Gothic*. Inigo's designs of that period are not Gothic, but have a little-ness of parts, and a weight of ornaments, with which the revival of the Grecian taste was encumbered, and which he shook off in his grander designs. The surveyor's place fell, and he returned to England; and, as if architecture was not all he had learned at Rome, with an air of Roman disinterestedness he gave up the profits of his office, which he found extremely in debt; and prevailed upon the comptroller and pay-master to imitate his example, till the whole arrears were cleared.

In 1620 he was employed in a manner very unworthy of his genius: king James set him upon discovering, that is, guessing, who were the founders of Stonehenge. His ideas were all Romanized; consequently, his partiality to his favourite people, which ought rather to have prevented him from charging them with that mass of barbarous clumsiness, made him conclude it a Roman temple.

In the same year Jones was appointed one of the commissioners for the repair of St. Paul's; but which was not commenced till the year 1633, when Laud, then bishop of London, laid the first stone, and Inigo the fourth. In the restoration of that cathedral, he made two capital faults. He first renewed the sides with very bad Gothic; and then added a Roman portico, magnificent and beautiful indeed, but which had no affinity with the ancient parts that remained, and made his own Gothic appear ten times heavier. He committed the same error at Winchester, thrusting a screen in the Roman or Grecian taste into the middle of that cathedral. Jones indeed was by no means successful when he attempted Gothic. The chapel of Lincoln's Inn has none of the characteristics of that architecture. The cloyster beneath seems oppressed by the weight of the building above.

The authors of the Life of Jones place the erecting of the Banqueting-house in the reign of king Charles; but it appears, from the accounts of Nicholas Stone, that it was begun in 1619, and finished in two years—a small part of the pile designed for the palace of our kings; but so complete in itself, that it stands a model of the most pure and beautiful taste. Several plates of the intended palace at Whitehall have been given; but Mr. Walpole thinks, from no finished design. The four great sheets are evidently made up from general hints; nor could such a source of invention and taste as the mind of

Inigo ever produce so much sameness. The whole fabric, however, was so glorious an idea, that one forgets for a moment (says Mr. Walpole), in the regret for its not being executed, the confirmation of our liberties, obtained by a melancholy scene that passed before the windows of that very Banqueting-house.

In 1623 he was employed at Somerfet-house, where a chapel was to be fitted up for the Infanta, the intended bride of the prince. The chapel is still in being. The front to the river, part only of what was designed, and the water-gate, were erected afterwards on the designs of Inigo, as was the gate at York-stairs.

On the accession of Charles, Jones was continued in his posts under both king and queen. His fee as surveyor was 8s. 4d. a day, with an allowance of 46l. a-year for house-rent, besides a clerk, and incidental expences. What greater rewards he had are not upon record.

During the prosperous state of the king's affairs, the pleasures of the court were carried on with much taste and magnificence. Poetry, painting, music, and architecture, were all called in to make them rational amusements. Mr. Walpole is of opinion, that the celebrated festivals of Louis XIV. were copied from the shows exhibited at Whitehall, in his time the most polite court in Europe. Ben Jonson was the laureat; Inigo Jones the inventor of the decorations; Lanieri and Ferrabosco composed the symphonies; the king, the queen, and the young nobility danced in the interludes. We have accounts of many of those entertainments, called *masques*; they had been introduced by Anne of Denmark. Lord Burlington had a folio of the designs for these solemnities, by Inigo's own hand, consisting of habits, masks, scenes, &c. The harmony of these masks was a little interrupted by a war that broke out between the composers, Inigo and Ben; in which, whoever was the aggressor, the turbulent temper of Jonson took care to be most in the wrong.

The works of Inigo Jones are not scarce; Surgeon's hall is one of his best works. One of the most admired is the Arcade of Covent-garden, and the Church: "two structures (says Mr. Walpole), of which I want taste to see the beauties. In the arcade there is nothing remarkable; the pilasters are as ardent and homely stripes as any plasterer would make. The barn-roof over the portico of the church strikes my eyes with as little idea of dignity and beauty, as it could do if it covered nothing but a barn. It must be owned, that the defect is not in the architect, but in the order.—Who ever saw a beautiful Tuscan building? Would the Romans have chosen that order for a temple?" The expence of building that church was 4500l.

Ambresbury in Wiltshire was designed by Jones, but executed by his scholar Webb. Jones was one of the first that observed the same diminution of pilasters as in pillars. Lindsey-house in Lincoln's-lin Fields, which he built, owes its chief grace to this singularity. In 1618 a special commission was issued to the lord chancellor, the earls of Worcester, Pembroke, Arundel, and others, to plant and reduce to uniformity Lincoln's-lin Fields, as it should be drawn by way of map, or ground-plot, by Inigo Jones, surveyor-general of the works. That square is laid out with a regard to so trifling a singularity, as to be of the exact dimensions of one of the pyramids: this would have been admired in those ages when the Keep at Kennelworth Castle was erected in the form of an horse-fetter, and the Escurial in the shape of St. Laurence's gridiron.

Colehill in Berkshire, the seat of Sir Matthew Pleydell, built in 1650, and Cobham-hall in Kent, were Jones's. He was employed to rebuild Castle Ashby, and finished one front: but the civil war interrupted his progress there and at Stoke-park in Northamptonshire. Shaftsbury-house, now the General Dispensary, on the east side of Aldersgate-street, is a beautiful

front. The Grange, the seat of the lord chancellor Henley, in Hampshire, is entirely of this master. It is not a large house, but by far one of the best proofs of his taste. The hall, which opens to a small vestibule with a cupola, and the stair-case adjoining, are beautiful models of the purest and most classic antiquity. The gate of Peaufort-garden at Chelsea, designed by Jones, was purchased by lord Burlington, and transported to Chiswick. He drew a plan for a palace at Newmarket; but not that wretched hovel that stands there at present. One of the most beautiful of his works is the Queen's house at Greenwich. The first idea of the hospital is said to have been taken by his scholar Webb, from his papers.

Inigo tasted early the misfortunes of his master. He was not only a favourite, but a Roman Catholic: in 1646 he paid 545 l. for his delinquency and sequestration. Whether it was before or after this fine, it is uncertain, that he and Stone the mason buried their joint stock in Scotland-yard; but an order being published to encourage the informers of such concealments, and four persons being privy to the spot where the money was hid, it was taken up, and reburied in Lambeth-marsh. Grief, misfortunes, and age, put an end to his life at Somerset-house, July 21, 1651. Several of his designs have been published by Mr. Kent, Mr. Colin Campbell, and Mr. Isaac Ware. He left in MS. some curious notes on Palladio's architecture, which are inserted in an edition of Palladio published in 1714.

IONIA, a country of Asia minor, bounded on the north by Æolia, on the west by the Ægean and Icarian seas, on the south by Caria, and on the east by Lydia and part of Caria. It was founded by colonies from Greece, and particularly Attica, by the Ionians or subjects of Ion. Ionia was divided into 12 small states, which formed a celebrated confederacy often mentioned by the ancients. These 12 states were Priene, Miletus, Colophon, Clazomenæ, Ephesus, Lebedos, Teos, Phocæa, Erythræ, Smyrna, and the capitals of Samos and Chios. The inhabitants of Ionia built a temple which they called *Pan Ionium* from the concourse of people that flocked there from every part of Ionia. After they had enjoyed for some time their freedom and independence, they were made tributary to the power of Lydia by Cræsus. The Athenians assisted them to shake off the slavery of the Asiatic monarchs; but they soon forgot their duty and relation to their mother-country, and joined Xerxes when he invaded Greece. They were delivered from the Persian yoke by Alexander, and restored to their original independence. They were reduced by the Romans under the dictator Sylla. Ionia has been always celebrated for the salubrity of the climate, the fruitfulness of the soil, and the genius of its inhabitants.

IONIC ORDER. See ARCHITECTURE.

IONIC *Dialect*, in grammar, a manner of speaking peculiar to the people of Ionia.

IONIC *Sect* was the first of the ancient sects of philosophers; the others were the Italic and Eleatic. The founder of this sect was Thales, who, being a native of Miletus in Ionia, occasioned his followers to assume the appellation of *Ionian*: Thales was succeeded by Anaximander, and he by Anaximenes, both of Miletus; Anaxagoras Clazomenius succeeded them, and removed his school from Asia to Athens, where Socrates was his scholar. It was the distinguishing tenet of this sect, that water was the principle of all natural things.

IONIUM MARE, a part of the Mediterranean Sea, at the bottom of the Adriatic. It lies between Sicily and Greece. That part of the Ægean sea which lies on the coasts of Ionia in Asia, is called the *Sea of Ionia*, and not the *Ionian Sea*. According to some authors, the Ionian sea receives its name from Io, who swam across there after she had been metamorphosed into a heifer.

JONK, or JONQUE, in naval affairs, is a kind of small ship, very common in the East Indies. These vessels are about the

bigness of our fly-boats; and differ in the form of their building, according to the different methods of naval architecture used by the nations to which they belong. Their sails are frequently made of mats, and their anchors are made of wood.

JONSON (BEN), see JOHNSON.

JONSTON (JOHN), a learned Polish naturalist and physician, born in 1603. He travelled all over Europe, and procured esteem every where by his knowledge; afterward he bought the estate of Ziebendorf, in the duchy of Lignitz in Silesia, where he spent the remainder of his days. He wrote a natural history of birds, fish, quadrupeds, insects, serpents, and dragons, in folio; a piece upon the Hebrew and Greek festivals, a thaumatography, and some poems. He died in 1675.

JOPPA, a sea-port town in Palestine, lying south of Cæsarea; and anciently the only port to Jerusalem, whence all the materials sent from Tyre towards the building of Solomon's temple were brought hither and landed (2 Chr. ii. 16.). It is said to have been built by Japhet, and from him to have taken its name *Japho*, afterwards moulded into *Joppa*; and the very heathen geographers speak of it as built before the Flood. It is now called *Jaffa*, somewhat nearer to its first appellation, and is but in a poor and mean condition.

JOR, the Hebrew for a river, which, joined with Dan, concurs to form the term *Jordan*. See DAN.

JORDANO (LUCA), an eminent Italian painter, was born at Naples in 1632. He became very early a disciple of Joseph Ribera; but going afterwards to Rome he attached himself to the manner of Pietro da Cortona, whom he assisted in his great works. Some of his pictures being seen by Charles II. king of Spain, he engaged him in painting the Escorial; in which task he acquitted himself as a great painter. The king showed him a picture of Bassani, expressing his concern that he had not a companion: Luca painted one so exactly in Bassani's manner, that it was taken for a performance of that master; and for this service he was knighted, and gratified with several honourable and valuable employments. The great works he executed in Spain, gave him still greater reputation when he returned to Naples; so that, though he was a very quick workman, he could not supply the eager demands of the citizens. No one, not even Tintoret, ever painted so much as Jordano; and his generosity carried him so far as to present altar-pieces to churches that were not able to purchase them. His labours were rewarded with great riches; which he left to his family, when he died, in 1705.

JORDANS (JAMES), one of the most eminent painters of the Flemish school, was born at Antwerp in 1593. He learned the principles of his art from Adam Van Ort, whose daughter he married; which connection hindered him from gratifying his inclination of visiting Italy. He improved most under Rubens; for whom he worked, and from whom he drew his best principles: his taste directed him to large pieces; and his manner was strong, true, and sweet. A great number of altar-pieces painted by him are preserved in the churches in the Netherlands, which maintain the reputation of this artist. He died in 1678.

JORTIN (JOHN), a very learned and ingenious English clergyman, was born in Huntingdonshire about the year 1701. Having some private fortune of his own, and being of a peculiar disposition that could not solicit promotion, he remained long without preferment. In 1738, lord Winchester gave him the living of Eastwell in Kent; but the place not agreeing with his health, he soon resigned it. Archbishop Herring, who had a great value for him, about the year 1751 presented him to the living of St. Dunstan's in the East; and bishop Osbaldiston in 1762 gave him that of Kensington, with a prebend in St. Paul's cathedral, and made him archdeacon of London. His temper, as well as his aspect, was rather morose and saturnine; but in company that he liked, he was at all times facetious, yet still

with a mixture of *ful censura superiorum*. His sermons were sensible and argumentative; and would have made more impression on his hearers, had he been more attentive to the advantages flowing from a good delivery: but he appeared to greater advantage as a writer. His remarks on ecclesiastical history, his six dissertations, his life of Erasmus, and his sermons, were extremely well received by the public, and have undergone several editions. He died in the year 1770.

JOSEPH, the son of Jacob; memorable for his chastity, and the honours conferred on him at the court of Egypt, &c. He died in 1635 B. C. aged 110.

JOSEPHUS, the celebrated historian of the Jews, was of noble birth, by his father Mattathias descended from the high-priests, and by his mother of the blood-royal of the Maccabees: he was born A. D. 37, under Caligula, and lived under Domitian. At 16 years of age he betook himself to the sect of the Essenes, and then to the Pharisees; and having been successful in a journey to Rome, upon his return to Judæa he was made captain-general of the Galilæans. Being taken prisoner by Vespasian, he foretold his coming to the empire, and his own deliverance by his means. He accompanied Titus at the siege of Jerusalem, and wrote his "Wars of the Jews," which Titus ordered to be put in the public library. He afterwards lived at Rome, where he enjoyed the privileges of a Roman citizen, and where the emperors loaded him with favours, and granted him large pensions. Besides the above work, he wrote, 1. Twenty books of Jewish antiquities, which he finished under Domitian. 2. Two books against Apion. 3. An elegant discourse on the martyrdom of the Maccabees. 4. His own life. These works are excellently written in Greek.

JOSHUA, the renowned general of the Jews, who conducted them through the wilderness, &c. died in 1424 B. C. aged 110.

JOSHUA, a canonical book of the Old Testament, containing a history of the wars and transactions of the person whose name it bears. This book may be divided into three parts: the first of which is a history of the conquest of the land of Canaan; the second, which begins at the 12th chapter, is a description of that country, and the division of it among the tribes; and the third, comprised in the two last chapters, contains the renewal of the covenant he caused the Israelites to make, and the death of their victorious leader and governor. The whole comprehends a term of 17, or, according to others, of 27 years.

JOSIAH, king of Judah; the destroyer of idolatry, and the restorer of the true worship, an excellent magistrate, and a valiant general, was slain in battle, 609 B. C.

JOTAPATA, in ancient geography, a town of the Lower Galilee, distant 40 stadia from Gabara; a very strong place, situated on a rock, walled round, and encompassed on all hands with mountains, so as not to be seen but by those who came very near. It was with great difficulty taken by Vespasian, being defended by Josephus, who commanded in it; when taken, it was ordered to be razed.

JOUBERT (LAWRENCE), counsellor and physician to the king of France, chancellor and judge of the university of Montpellier, was born at Valance in Dauphiny in 1530. He became the disciple of Rondelet at Montpellier; and at his death succeeded to the regius professorship of that university, where he had given abundant proofs of his merit, and strengthened his reputation by the lectures he read in that capacity, as well as by the works he published. Henry III, who passionately wished to have children, sent for him to Paris, in hopes by his assistance to render his marriage fruitful; but he was disappointed, without any loss of repute to Joubert. Much of his time was indeed taken at a piece he published under the title

of *Vulgar Errors*, in which he treated of virginity and generation more plainly than had ever before been done in the French language. But, though he had promised something more on the same subject, he was so piqued at the clamour raised against it, that the public saw no more of six parts promised, than the first, and part of the second, though they were greatly called for. He died in 1582; and his son Isaac translated some of his Latin paradoxes into French.

JOVIAN, the Roman emperor, elected by the army, after the death of Julian the apostate, in 363. He at first refused, saying he would not command idolatrous soldiers; but, upon an assurance that they would embrace Christianity, he accepted the throne, and immediately shut all the Pagan temples, and forbade their sacrifices. But he did not long enjoy the dignity to which his merit had raised him; being suffocated in his bed by the fumes of a fire that had been made to dry the chamber, in 364, the 33d of his age, and the eighth month of his reign.

JOVIUS (PAUL), in Italian *Giovio*, a celebrated historian, was born at Como in Italy in the year 1483. As his father died in his infancy, he was educated by his eldest brother Benedict Jovius, under whom he became well skilled in classical learning; and then went to Rome, for the sake of enjoying the benefit of the Vatican library. He there wrote his first piece, *De piscibus Romanis*, which he dedicated to cardinal Lewis of Bourbon. He received a pension of 500 crowns for many years from Francis I. king of France, whose favour he secured by his flatteries. But, in the following reign, having disgusted the constable Montmorency, his name was struck out of the list of pensioners. Jovius did not suffer his spirits to sink under his misfortune: he had obtained a high reputation in the learned world by his writings; and having always showed great respect to the house of Medicis, on whose praises he had expatiated in his works, he applied to Clement VII. and obtained the bishoprick of Nocera. His principal piece is his history, which is that of his own time throughout the world, beginning with 1494, and extending to the year 1544. This was the chief business of his life. For he formed the plan of it in the year 1515; and continued upon it till his death, which happened at Florence in 1552. It is printed in three volumes folio. He is allowed to have been a man of wit as well as learning: he was master of a bright and polished style, and has many curious observations: but being a venal writer, his histories are not much credited.

JOURNAL, a day-book, register, or account of what passes daily. See DIARY. In merchants' accounts, it denotes a book into which every particular article is posted out of the waste-book, and made debtor. This is to be very clearly worded, and fairly engrossed. See BOOK-KEEPING.

JOURNAL, in navigation, a sort of diary, or daily register of the ship's course, winds, and weather; together with a general account of whatever is material to be remarked in the period of a sea-voyage. In all sea journals, the day, or what is called the 24 hours, terminates at noon, because the errors of the dead-reckoning are at that period generally corrected by a solar observation. The daily compact usually contains the state of the weather; the variation, increase, or diminution of the wind; and the suitable shifting, reducing, or enlarging the quantity of sail extended; as also the most material incidents of the voyage, and the condition of the ship and her crew; together with the discovery of other ships or fleets, lands, shoals, breakers, soundings, &c.

JOURNAL is also a name common for weekly essays, newspapers, &c. as the Gray's-Inn journal, the Westminster journal, &c.

JOURNAL is also used for the titles of several books which come out at stated times, and give abstracts, accounts, &c. of the books that are published, and the new improvements daily.

made in arts and sciences; as the *Journal des Sçavans*, *Journal de Physique*, &c.

JOUVENET (JOHN), a celebrated French painter, was born at Rouen in 1644; where his father, who was a painter, bred him up to the same profession: but his greatest improvement was confessedly derived from the instructions of Nicholas Poussin, and studying the works of that master. He acquired so good a knowledge of design, as qualified him for employment in several grand works in the palaces at Paris and Trianon; in many of the churches and convents; and in the hospital of invalids, where he painted the twelve apostles, each figure being 14 feet high. He was esteemed to have a ready invention, to be correct in his designs, and to have a taste for grandeur in his compositions: it is observed of this artist, that, being deprived of the use of his right hand by a paralytic disorder, he nevertheless continued to paint with his left. He died in the year 1717.

JOY, in ethics, is that passion which is produced by love, regarding its object as present, either immediately or in prospect, in reality or imagination. This passion has been said to increase the perspiration and urine of human bodies.

IPECACUANHA, in the materia medica, a West-Indian root, of which there are principally two kinds, distinguished by their colour, and brought from different places: but both possessing the same virtues, though in a different degree. The one is ash coloured or grey, and brought from Peru; the other is brown, and is brought from the Brasils: and these are indifferently sent into Europe under the general name of *ipecacuanha*. These two sorts have been by some supposed to be the roots of two different plants: but, according to others, this is a mistake; the only difference being, that one grows in a different place, and in a richer and moister soil, and is better supplied with juices than the other. The plant they belong to is a species of *PSYCHOTRIA*.

The ash-coloured ipecacuan is a small wrinkled root, bent and contorted into a great variety of figures, brought over in short pieces full of wrinkles, and deep circular fissures, quite down to a small white woody fibre that runs in the middle of each piece: the cortical part is compact, brittle, looks smooth and resinous upon breaking: it has very little smell; the taste is bitterish and subacid, covering the tongue as it were with a kind of mucilage. The brown sort is small, and somewhat more wrinkled than the foregoing; of a brown or blackish colour without, and white within. The first sort, the ash-coloured or grey ipecacuan, is that usually preferred for medicinal use. The brown has been sometimes observed, even in a small dose, to produce violent effects. A third sort, called the *white* from its colour, has also been distinguished. It is woody, has no wrinkles, and no perceptible bitterness in taste. This, though taken in a large dose, has scarcely any effect at all. It is supposed to belong to a species of *VIOLA*. Mr. Geoffroy calls this sort *bastard ipecacuan*, and complains that it is an imposition upon the public. Geoffroy, Neumann, Dale, and Sir Hans Sloane, inform us, that the roots of a kind of apocynum (dogs-bane) are too frequently brought over instead of it; and instances are given of ill consequences following from the use of it. But if the marks above laid down, particularly the ash colour, brittleness, deep wrinkles, and bitterish taste, be carefully attended to, all mistakes of this kind may be prevented.

Ipecacuan was first brought into Europe about the middle of last century, and an account of it published about the same time by Piso; but it did not come into general use till about the year 1786, when Helvetius, under the patronage of Louis XIV. introduced it into practice. This root is one of the mildest and safest emetics with which we are acquainted; and has this peculiar advantage, that if it should not operate by

vomit, it passes off by the other emunctories. It was first introduced among us with the character of an almost infallible remedy in dysenteries, and other inveterate fluxes, as menorrhagia and leucorrhœa, and also in disorders proceeding from obstructions of long standing: nor has it lost much of its reputation by time. In dysenteries, it almost always produces happy effects, and often performs a cure in a very short space of time. In other fluxes of the belly, in beginning dysenteries, and such as are of a malignant kind, or where the patient breathes a tainted air, it has not been found equally successful: in these cases it is necessary to continue the use of this medicine for several days, and to join with it opiates, diaphoretics, and the like. This root, given in substance, is as effectual, if not more so, than any of the preparations of it: the pure resin acts as a strong irritating emetic, but is of little service in dysenteries; while an extract prepared with water is almost of equal service in these cases with the root itself, though it has little effect as an emetic. Geoffroy concludes from hence, that the chief virtue of ipecacuan in dysenteries depends upon its gummy substance, which lining the intestines with a soft mucilage, when their own mucus has been abraded, occasions their exulcerations to heal, and defends them from the acrimony of the juices: and that the resinous part, in which the emetic quality resides, is required where the morbid matter is lodged in the glands of the stomach and intestines. But if the virtues of this root were entirely owing to its mucilaginous or gummy part, pure gum, or mucilages, might be employed to equal advantage. Water, assisted by a boiling heat, takes up from all vegetables a considerable portion of resinous along with the gummy matter: if the ipecacuan remaining after the action of water be digested with pure spirit, it will not yield half so much resin as at first; so that the aqueous extract differs from the crude root only in degree, being proportionably less resinous, and having less effect, both as an emetic, and in the cure of dysenteries. The virtues of ipecacuan, in this disorder, depend upon its promoting perspiration, the freedom of which is here of the utmost importance, and an increase of which, even in healthful persons, is generally observed to suppress the evacuation by stool. In dysenteries, the skin is for the most part dry and tense, and perspiration obstructed: the common diaphoretics pass off without effect through the intestinal canal: but ipecacuan, if the patient after a puke or two be covered up warm, brings on a plentiful sweat. After the removal of the dysentery, it is necessary to continue the use of the medicine for some time longer, in order to prevent a relapse; for this purpose, a few grains divided into several doses, so as not to occasion any sensible evacuation, may be exhibited every day: by this means the cure is effectually established. And indeed small doses, given even from the beginning, have been often found to have better effects in the cure of this disease than larger ones. Geoffroy informs us from his own experience, that he has observed ten grains of the powder to act as effectually as a scruple or two; and therefore confines the dose betwixt six and ten grains: it has lately been found, that even smaller doses prove sufficiently emetic. The only official preparation of this root is a tincture made in wine, which accordingly has now the appellation of *vinum ipecacuanhe* both in the London and Edinburgh pharmacopœias.

Many ingenious experiments have been made on the subject of ipecacuan by Dr. Living, for which he obtained the prize medal of the Harveian Society at Edinburgh for 1784. He has ascertained, that while this root contains a gummy resinous matter, yet that the gummy exists in a much greater proportion than the resinous part; that the gummy part is much more powerfully emetic than the resinous; that although the cortical part of the root be more active than the ligneous,

yet that even the pure ligneous part possesses a considerable emetic power; and that the whole of the root possesses considerable influence, both as an antiseptic and astringent. To determine whether the emetic power of ipecacuan was of a volatile or fixed nature, Dr. Irving subjected it to distillation. The water obtained by distillation was found to have very little influence; but the decoction which remained in the still, not only operated violently as an emetic, but produced rigours, cold sweats, and other alarming symptoms. By long continued boiling, the activity of the root itself is almost totally destroyed; but Dr. Irving found, that the emetic property of ipecacuan was most effectually counteracted by means of the acetic acid, inasmuch that thirty grains of the powder taken in two ounces of vinegar produced only some loose stools.

Ipecacuan, particularly in the state of powder, is now advantageously employed in almost every disease in which full vomiting is indicated; and when combined with opium under the form of the pulvis fudorificus, it furnishes us with the most useful and active sweating medicine which we possess. It is also often given with advantage in very small doses, so as neither to operate by vomiting, purging, nor sweating.

The full dose of the powder is a scruple or half a dram, and double that in form of watery infusion. The full dose is recommended in the paroxysm of spasmodic asthma, and a dose of three or four grains every morning in habitual asthmatic indisposition. A dose of $\frac{1}{3}$ or $\frac{1}{2}$ grain rubbed with sugar, and given every four hours or oftener, is recommended in uterine hemorrhagy, cough, pleurisy, hæmoptoe, &c. and has often been found highly serviceable.

IPHIGENIA, a daughter of Agamemnon and Clytemnestra. When the Greeks going to the Trojan war were detained by contrary winds at Aulis, they were informed by one of the soothsayers, that to appease the gods they must sacrifice Iphigenia, Agamemnon's daughter, to Diana. The father, who had provoked the goddess by killing her favourite stag, heard this with the greatest horror and indignation; and rather than shed the blood of his daughter, he commanded one of his heralds, as chief of the Grecian forces, to order all the assembly to depart each to his respective home. Ulysses and the other generals interfered, and Agamemnon consented to immolate his daughter for the common cause of Greece. As Iphigenia was tenderly loved by her mother, the Greeks sent for her on pretence of giving her in marriage to Achilles. Clytemnestra gladly permitted her departure, and Iphigenia came to Aulis. Here she saw the bloody preparations for the sacrifice. She implored the forgiveness and protection of her father; but tears and entreaties were unavailing. Calchas took the knife in his hand; and as he was going to strike the fatal blow, Iphigenia suddenly disappeared, and a goat of uncommon size and beauty was found in her place for the sacrifice. This supernatural change animated the Greeks, the wind suddenly became favourable, and the combined fleet set sail from Aulis.

IPICRATES, general of the Athenians, had that command conferred upon him at 20 years of age, and became famous for the exactness of his military discipline. He made war on the Thracians; restored Scythians, who was an ally of the Athenians; attacked the Lacedæmonians; and, on many other occasions, gave signal proofs of his conduct and courage. Many ingenious repartees have been mentioned of this general: a man of good family with no other merit than his nobility, reproaching him one day for the meanness of his birth, he replied, "I shall be the first of my race, and thou the last of thine." He died 480 B. C.

IPOMEA, **QUAMOILIT**, or *Scarlet Convolvulus*; a genus of the rotogymna order, belonging to the pentandria class of plants; and in the natural method ranking under the 29th order, *Companaceæ*. The corolla is funnel-shaped; the stigma

round-headed; the capsule trilocular. There are several species; but not more than one (the *coccinea*) cultivated in our gardens. This hath long, slender, twining stalks, rising upon support six or seven feet high. The leaves are heart-shaped, pointed, and angulated at the base; and from the sides of the stalks and branches arise many slender foot-stalks, each supporting several large and beautiful funnel-shaped and scarlet flowers. There is a variety with orange-coloured flowers. Both of them are annual, rising from seed in spring, flowering in July and August, ripening their seeds in September and October, and totally perishing in a short time after. They are tender, and must be brought up in a hot-bed till the latter end of May or beginning of June, when they may be planted out to adorn the borders, or some may be planted in pots to move occasionally to adorn any particular place; but in either case there must be sticks for them to twine upon.

IPSWICH, a borough of Suffolk, with markets on Wednesday, Friday and Saturday. It is seated on the river Orwell, near the place where the fresh and salt water meet. It is a place of great antiquity, and was once surrounded by a wall, traces of which are yet to be seen. It is divided into four wards, containing 12 parish churches, with a Presbyterian, an Independent, and a Quaker's meeting-house; and has a handsome guild-hall, two hospitals, a free-school, with a good library, several alms-houses, and a custom-house with a good quay. It is governed by two bailiffs, a recorder, 12 portmen (from whom two bailiffs are chosen), a town-clerk, 2 chamberlains, 2 coroners, and 24 common-council-men. It is populous and well inhabited, though irregularly built; but it has declined from its former consequence. Its manufactures of broad-cloth and canvas are at an end; and its present commerce chiefly depends upon the malting and exportation of corn. It has a considerable coasting trade and a small share of foreign commerce, and has lately sent ships to Greenland. Vessels of large burden are obliged to stop at some distance below the town. It is noted for being the birth-place of Cardinal Wolsey; is 20 miles N. E. of Colchester, and 69 N. E. of London. E. lon. 1. 16. N. lat. 52. 8.

IRASCIBLE, in the old philosophy, a term applied to an appetite or a part of the soul where anger and the other passions, which animate us against things difficult or odious, were supposed to reside. Of the eleven kinds of passions attributed to the soul, philosophers ascribe five to the irascible appetite; viz. wrath, boldness, fear, hope, and despair: the other six are charged on the concupiscible appetite, viz. pleasure, pain, desire, aversion, love, and hatred. Plato divided the soul into three parts; the reasonable, irascible, and concupiscible parts. The two last, according to that philosopher, are the corporeal and mortal parts of the soul, which give rise to our passions. Plato fixes the seat of the irascible appetite in the heart; and of the concupiscible in the liver; as the two sources of blood and spirits, which alone affect the mind.

IRELAND, one of the British islands lying to the W. of that of Great Britain. It is bounded on the E. by St. George's Channel and the Irish sea, which separate it from England and Wales; on the N. E. by a channel about 20 miles broad, which separates it from Scotland; and on every other side by the ocean. It lies between W. lon. 5. 25. and 10. 40. and between N. lat. 51. 15. and 55. 15. being about 278 miles in length, and 155 in breadth. It is divided into four large provinces; namely, Ulster to the N. Leinster to the E. Munster to the south, and Connaught to the W.; and these are subdivided into counties. The air is mild and temperate, being cooler in summer, and warmer in winter, than in England: though it is not so clear and pure, nor so proper for ripening corn and fruits. It is more humid than in England; for which reason strangers at first are very liable to colds, &c. but this

quality is pretty much mended, and will be more so when the bogs and morasses are drained. In general, it is a fruitful, level country, well watered with lakes and rivers; and the soil, in most parts, is very good and fertile: even in those places where the bogs and morasses have been drained, there is good meadow ground. It produces corn, hemp, and flax, in great plenty; and there are so many cattle, that their beef and butter are exported into foreign parts; and not only the English but other ships frequently come to be victualled here. The principal riches and commodities of Ireland are, cattle, hides, wool, tallow, suet, butter, cheese, wood, salt, honey, wax, furs, hemp, and, more especially, fine linen cloth, which they have brought to great perfection, and their trade in it is vastly increased. This country is exceedingly well situated for foreign trade, on account of their many secure and commodious harbours. Their laws differ but little from those of England; and the established religion is the same. The members of parliament usually sat for life, unless upon the demise of the king of Great Britain; but in 1768 their parliaments were made octennial. Formerly, this kingdom was entirely subordinate to that of Great Britain, whose parliament could make laws to bind the people of Ireland; and an appeal might be made from their courts of justice to the house of lords in England: but, in 1782, it was declared, that although Ireland was an imperial crown, inseparably annexed to that of Britain (on which connection the interest and happiness of both nations essentially depended), yet the kingdom of Ireland was distinct, with a parliament of its own, and that no body of men were competent to make laws for Ireland, except the king, lords, and commons thereof. And, some time after, this declaration being thought insufficient, the British legislature, in the most solemn manner, by an express act of parliament for that purpose, relinquished all claim of right to interfere with the judgment of the Irish courts, or to make laws to bind Ireland in time to come. The lord lieutenant of Ireland, as well as the council, are appointed from time to time by the king. There is usually a body of 16,000 men kept in pay on the Irish establishment. They are not quartered in public houses, but lodge in barracks built for that purpose. There are a great number of Roman catholics in this country, whose religion is tolerated, and to whom, in 1793, the liberal spirit of the Irish legislature granted many important concessions. There are likewise many protestant dissenters, particularly in the N. of Ireland. Dublin is the only university in the kingdom; and that consists of one college, in which there are about 600 students. The common people were so poor, and it was so hard for them to get a livelihood, that they frequently went into other countries to seek their fortunes; and, particularly, great numbers went over to the plantations in America. That part of the inhabitants called the Wild Irish, were formerly as savage as the native Americans; and, like them, lived in huts, making a fire in the middle of them: but it is to be hoped that all the rude and barbarous customs, by which they have been hitherto distinguished from more civilized people, as well as every other trace of wretchedness and degradation, will vanish in time, since the emancipation of the country has removed the ancient restrictions on their commerce and manufactures, and left them to the pursuits of industry and enterprise, on the same footing as the happiest subjects of the British empire. Ireland contains 32 counties, four archbishoprics, and 18 bishoprics. Its principal rivers are the Shannon, Boyne, Liffey, &c. Dublin is the capital.

IRENÆUS (St.), a bishop of Lyons, was born in Greece about the year 120. He was the disciple of Pappias and St. Polycarp, by whom, it is said, he was sent into Gaul in 157. He stopped at Lyons, where he performed the office of a priest; and in 178 was sent to Rome, where he disputed with Valentinus, and his two disciples Florinus and Blastus. At his re-

turn to Lyons, he succeeded Photinus, bishop of that city; and suffered martyrdom in 202, under the reign of Severus. He wrote many works in Greek, of which there only remains a barbarous Latin version of his five books against heretics, some Greek fragments in different authors, and pope Victor's letter mentioned by Eusebius. The best editions of his works are those of Erasmus, in 1526; of Grabe, in 1702; and of Father Massuet, in 1710. St. Irenæus's style is close, clear, and strong, but plain and simple. Dodwell has composed six curious dissertations on the works of St. Irenæus. He ought not to be confounded with St. Irenæus the deacon, who in 255 suffered martyrdom in Tuscany, under the reign of Aurelian; nor with St. Irenæus bishop of Sirmich, who suffered martyrdom on the 25th of March 304, during the persecution of Dioclesian and Maximianus.

IRENE, empress of the East, celebrated for her valour, wit, and beauty; but detestable for her cruelty, having sacrificed her own son to the ambition of reigning alone. She died in 803.

IRENE, in botany; a genus of the pentandria order, belonging to the diœcia class of plants; and in the natural method ranking under the 54th order, *Miscellanea*. The male calyx is diphyllous, the corolla pentapetalous; and there are five nectaria. The female calyx is diphyllous, the corolla pentapetalous; there are two sessile stigmata, and a capsule with fleshy seeds.

IRIS, in physiology, the rainbow. The word is Greek, *ἰρις*, supposed by some to be derived from *ἰρῶ* "I speak, I tell;" as being a meteor that is supposed to foretell, or rather to declare, rain. See RAINBOW.

Lunar IRIS, or Moon-rainbow. See Lunar RAINBOW.

IRIS, in anatomy, a striped variegated circle round the pupil of the eye, formed of a duplicature of the uvea. See ANATOMY, p. 210.

IRIS is also applied to those changeable colours which sometimes appear in the glasses of telescopes, microscopes, &c. so called from their similitude to a rainbow. The same appellation is also given to that coloured spectrum, which a triangular prismatic glass will project on a wall when placed at a due angle in the sun-beams.

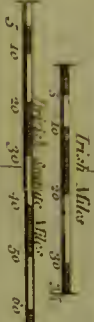
IRIS, the *Flower de Luce*, or Flag-flower, &c. in botany; a genus of the monogynia order, belonging to the triandria class of plants; and in the natural method ranking under the sixth order, *Ensatæ*. The corolla is divided into six parts; the petals alternately reflexed: the stigmata resembling petals.

There are 44 species, all herbaceous, flowering perennials, both of the fibrous, tuberous, and bulbous rooted kind, producing thick annual stalks from 3 or 4 inches to a yard high, terminated by large hexapetalous flowers, having three of the petals reflexed quite back, and three erect; most of which are very ornamental, appearing in May, June, and July. All the species are easily propagated by offsets from the roots, which should be planted in September, October, or November, though almost any time from September to March will do. They may also be raised from seed, which is the best method for procuring varieties. It is to be sown in autumn, soon after it ripens, in a bed or border of common earth, and raked in. The plants will rise in the spring, and are to be transplanted next autumn.

The roots of the Florentine white iris, when dry, are supposed to have a slight pectoral virtue. They have an agreeable smell, resembling that of violets; and hence are used in perfumes, and in flavouring of liquors. When recent, they have a bitter, acrid, nauseous taste; and when taken into the body, prove strongly cathartic; on which account they have been recommended in dropics, in the dose of three or four scruples. The juice of the species called *bastard acorus*, or *yellow flag-flower*, is also very acrid, and hath been found to produce

IRELAND

from the best
AUTHORITIES.



plentiful evacuations from the bowels when other means had failed. For this purpose, it may be given in doses of 80 drops every hour or two; but the degree of its acrimony is so uncertain, that it can hardly ever come into general use. Goats eat the leaves when fresh; but cows, horses, and swine, refuse them. Cows will eat them when dry. The roots are used in the island of Jura for dyeing black. The roots or bulbs of a species growing at the Cape are roasted in the ashes, and used as food by the natives: they are called *oenkjes*, and have nearly the same taste with potatoes. The Hottentots, with more reflection than generally falls to the share of savages, use the word *oenkjes* in the same sense in which Virgil used that of *aristæ*, that is, for reckoning of time; always beginning the new year whenever the *oenkjes* push out of the ground, and marking their age and other events by the number of times in which in a certain period this vegetable has made its appearance.—The Siberians, it is said, cure the venereal disease by a decoction of the root of the *Iris Siberica*, which acts by purging and vomiting. They keep the patient eight days in a stove, and place him in a bed of the leaves of the *arctium lappa*, or common burdock, which they frequently change till the cure is effected.

IRIS-Stone. See *MOON-Stone*.

IRON, one of the imperfect metals, but the hardest and most useful as well as the most plentiful of them all, is of a livid whitish colour inclining to grey, and internally composed to appearance of small facets; susceptible of a fine polish, and capable of having its hardness more increased or diminished by certain chemical processes than any other metal.

It is very generally diffused throughout the globe, being frequently found mixed with sand, clay, chalk, and being likewise the colouring matter of a great number of stones and earth. It is found also in the ashes of vegetables, and in the blood of animals, in such abundance, that some authors have attributed both the colours of vegetables, and of the vital fluid itself, to the iron contained in them. In consequence of this abundance the iron ores are extremely numerous.

1. Native iron, formerly thought not to have an existence any where, is now certainly known to have been met with in several places. It is however by no means common, but occurs sometimes in iron mines. Margraaff found a fibrous kind of it at Eibenstock in Saxony, and Dr. Pallas found a mass in Siberia weighing 1600 pounds. Mr. Adanson likewise informs us, that native iron is common about Senegal; but some naturalists are of opinion that these pieces which have been taken for native iron, are in reality artificial, and have been accidentally buried in the earth. The large piece mentioned by Dr. Pallas is of that species called *red short*, which is malleable when cold, but brittle when red hot.—A mass of a similar nature is said to have been lately found in South America.

This American mass of iron was discovered by some Indians, in the district of Santiago del Elero, in the midst of a wide extended plain. It projected about a foot above the ground, and almost the whole of its upper surface was visible; and the news of its being found in a country where there are no mountains, nor even the smallest stone within a circumference of 100 leagues, could not but be very surprising. Though the journey was attended with great danger on account of the want of water, and abundance of wild beasts in these deserts, some private persons, in hopes of gain, undertook to visit this mass; and, having accomplished their journey, sent a specimen of the metal to Lima and Madrid, where it was found to be very pure soft iron.

As it was reported that this mass was only the extremity of an immense vein of the metal, a commission was given to Don Michael Rubio de Cilia to examine the spot; and the following is an abstract of his account:

“The place is called *Omipa*, in lat. 27. 23. S. and the

mass was found almost buried in pure clay and ashes. Externally it had the appearance of very compact iron; but internally was full of cavities, as if the whole had been formerly in a liquid state. I was confirmed in this idea (says our author), by observing, on the surface of it, the impression of human feet and hands of a large size, as well as of the feet of large birds, which are common in this country. Though these impressions seem very perfect, yet I am persuaded that they are either a *lusus naturæ*, or that impressions of this kind were previously upon the ground, and that the liquid mass of iron falling upon it received them. It resembled nothing so much as a mass of dough; which having been stamped with impressions of hands and feet, and marked with a finger, had afterwards been converted into iron.

“On digging round the mass, the under surface was found covered with a coat of scoriæ from four to six inches thick, undoubtedly occasioned by the moisture of the earth, because the upper surface was clean. No appearance of generation was observed in the earth below or round it to a great distance. About two leagues to the eastward is a brackish mineral spring, the only one to be met with in all the country. Here there was a very gentle ascent of between four and six feet in height, running from north to south; all the rest being as perfect a level as can be imagined. The earth in every part about this spring, as well as near the mass, is very light, loose, and greatly resembling ashes even in colour. The grass of the adjacent parts is very short, small, and extremely unpalatable to cattle; but that at a distance is long, and extremely grateful to them: from all which circumstances it is probable that this mass was produced by a volcanic explosion. Its weight might be estimated at about 300 quintals. It is likewise an undoubted fact, that in these forests there exists a mass of pure iron in the shape of a tree with its branches. At a little depth in the earth are found stones of quartz of a beautiful red colour, which the honey-gatherers, the only persons who frequent this country, make use of as flints to light their fires. They had formerly carried some of them away on account of their peculiar beauty, being spotted and studded as it were with gold. One of these, weighing about an ounce, was ground by the governor of the district, who extracted from it a drachm of gold.”

The native iron, said to have been found about Senegal, has a cubical form; and out of this the black inhabitants make different kinds of vessels for their own use. Some masses have been found in a polyhedral granulated form, and of a bright yellow colour; but which, on being polished, show the proper colour of the metal. Mr. Bergman informs us, that the great mass of native metal found in Siberia resembles forged iron in its composition, a centenary, or 63 grains, yielding 49 cubic inches of inflammable air; and from many experiments it appears, that ductile iron yields from 48 to 51 cubic inches of the same kind of air. Dr. Matthew Guthrie informs us, that “the pores of this iron were filled with a yellow vitreous matter, of such hardness as to cut glass.” The cells are lined with a kind of varnish contiguous to the glassy substance within.

2. The *calciform ores* are either composed of the blackish, blackish-brown, or red calx of the metal; the former being in some measure magnetic, in consequence of the phlogiston it contains; the latter showing nothing of this property until it be roasted.

The name of *calciform* may be applied to all the ores of this metal, excepting the native iron already mentioned, and the native Prussian blues, of which we shall afterwards treat. All of them are mixed with different minerals, and generally take their colour from that of the calx of iron which is prevalent in them. Mr. Kirwan enumerates a great many different species.

3. *Steel ore*, *Stachlerz*, the *ferrum chalybeatum Linnæi*, and

minera ferri nigra of Cronstedt. This is of a dark colour, solid, and compact, but with difficulty striking fire with steel; reducible to a black powder, obedient to the magnet, and somewhat malleable when red hot; affording from 60 to 80 *per cent.* of good iron. It is met with in Sweden, the Isle of Elbe, and North America. The *ferrum tessulare* and *minera ferri crystallizata* of Wallerius belongs to this species, but is somewhat less magnetic. Our author denominates it crystallized iron ore in an octohedral or cubic form.

4. The *magnet*, according to Fourcroy, is a muddy iron ore, which, however, some authors suppose to be very near the metallic state. Mr. Kirwan says it differs but little from the foregoing, only that it has less lustre. There are two kinds, the fine and the coarse grained, of which the latter lose their power the soonest. When heated red hot, it smells of sulphur. Our author thinks it may contain nickel, as this semi-metal is found to possess a magnetic property when purified to a certain degree.

5. The brown calx of iron combined with plumbago, *black eisen glimmer*, *schwartz eisen balen* or *eisenman*, consists of black shining scales more or less magnetic, affording, according to Mr. Rinman, 26 *per cent.* of iron, the rest being plumbago.

6. The brown calx of iron united with the white calx of manganese and mild calcareous earth in various proportions. These constitute the white ores of iron, on which Mr. Bergman has given a dissertation. "They have received (says he) divers denominations from the singular heat with which they are accompanied. Their texture is almost the same with that of the calcareous stone, yet it is rarely found compact, and composed of impalpable particles. It is sometimes squamous, sometimes granulated with small distinct particles, some of them shining, but in general spathous. This description, however, is not meant for their complete and perfect state; for the figure of their parts is more or less destroyed by spontaneous calcination; nay, the whole mass is at length resolved into a powder: sometimes it is found stalaclitic, fistulous and ramous, cellular, or even germinating like moss. Sometimes, though very seldom, they have sufficient hardness to strike fire with steel; but though, when found mixed with flint and newly dug up, they are of this kind, yet they soon lose the property we speak of. When perfect, they generally resemble the calcareous stone, unless when exposed for some time to the air, by which the union of their parts is gradually diminished. Their colour is white, but the surface which comes into contact with the air grows gradually brown, or even blackish; yet as long as the iron which is converted into an ochre remains in them, they have a ferruginous hue; but though the surface is thus changed, the internal parts remain the same, and, on being filed or broken, exhibit the natural colour. This change is effected by the air, not upon the iron, as is commonly believed, but on the white calx of manganese which is dephlogistiated by the atmosphere.

"The specific gravity of the ore, when perfect, varies between 3,640 and 3,810, and is diminished according to the degree of calcination. The ore whose particles are quite separated is from 2.5 to 2.9; but that which is not perfectly corroded is from 3.3 to 3.6. It is rarely attracted by the magnet, whether perfect or calcined, though the metallic part sometimes amounts to nearly one half the weight.

"The white ores of iron are found, though in very small quantity, in Sweden. The *Suart-begger*, or *Black Mountain*, in Dalecarlia, has its name from its surface, which is grown black by calcination. It is high, and naked on the summit, which is crossed by a broad calcareous vein with shining particles of spar, and a white ore of iron, together with a galena, pseudo-galena, black ore of iron, pyrites, schœrl, and garnet intermixed. In the old mines at Hallefors, or the eastern mines, the rock itself

appears to consist of a white ore of iron; but in other places it is either found in small quantity, or very poor in metal. Many mountains about Smialkald in Germany contain these ores. In one called *Stahlbeger*, a broad vein occurs almost horizontal, and from 25 to 30 fathoms thick. It consists of an irregular spar, in which are dispersed quartz and pieces of the ore, which are found of a better quality in proportion as they are more deeply seated. The uppermost side, which is pendent, consists of a sandy stone from 9 to 20 fathoms high; but the lower is margaceous, and is found more indurated towards the lower parts; and at the very lowest is extended by a blue mica: the sides scarcely cohere to the vein. The whole mountain in Naussavia consists of a yellowish ore of iron, certain veins of which are accompanied with copper, and others with hematites. The hill of *Arzberg*, situated at Eisenartz in Upper Silesia, is 600 fathoms in circuit, 900 in diameter, and 450 in height. According to some accounts the ore is irregularly accumulated and concreted, consisting of masses of quartz charged with argillaceous earth and white ore of iron; but, according to others, the ore is found there not only in heaps, but in various veins."

This ore, when analysed, gave 38 parts of the brown calx of iron, 24 of the white calx of manganese, and 50 of mild calcareous earth. Another from West Silvesthreg yielded 22 of the brown calx of iron, 28 of the white calx of manganese, and 50 of mild calcareous earth. The aerial acid is used, and is united not only to the earth, but also to the metallic calx. The above proportions of the crude materials in the ore of Eisenartz would yield, according to Mr. Kirwan, 38 parts of calcareous earth, 38 of iron in its metallic state, and 24 of manganese. Many others are poorer, and some to such a degree as scarcely to deserve the name of an ore. They abound also in France and Spain, and are found sometimes in heaps, sometimes also forming veins, strata, or even whole mountains. Mr. Bergman never found them contain any organized bodies: a mark (says he) by which the most ancient productions of the earth have been distinguished. When this iron ore bears a stalaclitic appearance, and is very white, it is called *flos ferri*, and *eisen bluth*. An hundred parts of it yield 65 of calcareous earth, and 35 of calx of iron; which, according to Rinman, produce 27 of iron in its metallic state.

7. *Magnetic sand*. Of this kind is the black sand of Virginia, whose specific gravity is about 4.600, and contains half its weight of metal.

From an account inserted in the Philosophical Transactions for 1763, we are informed, that there are very large quantities of this sand-iron ore in Virginia; perhaps as large as of any other kinds of iron ore. It is so pure, that it requires a mixture of bog ore, or of slags from other smeltings, to reduce it to a metallic form. The iron and steel produced from it were above 60 *per cent.* or from 50 to 85; the quality of both extremely good; and two small bars were sent as a sample to the museum of the Royal Society of London. Large strata of black sand-iron ore are found in Portugal, even at a considerable distance from the sea-shore, or from any running waters. A very great part of this black sand is attracted by the magnet. There is also found, particularly in France, a black, heavy, unmagnetic sand, of the siliceous kind, which is said to contain iron and zinc in great quantity. Mr. Kirwan, p. 143. of his Mineralogy, speaks of a siliceous sand consolidated by semiphlogistated calx of iron, which does not crumble into sand when powdered. It is generally of a black or brown colour; but grows reddish or yellowish, and moulders by exposure to the air. It does not effervesce with acids, unless it contains testaceous particles, which is frequently the case; it is even frequently covered with shells. He adds, that the agglutinating power of solutions of iron has been shown by a stony concretion of this sort that had been long buried in the sea, and is men-

tioned in a paper of Mr. Edward King in the Philosophical Transactions for 1779. Mr. Rinman, however, has found that dephlogisticated calces of iron, and particularly its solutions in mineral acids, have no binding power.

8. Red calx of iron indurated and combined with a small quantity of clay, frequently with manganese.—Fourcroy calls this a muddy iron-ore, which seems to be formed in the manner of stalactites, and derives its name from its colour, which is commonly red, or the colour of blood, though not without variations. Mr. Kirwan says, that “it is generally of a red, yellow, purple, or brown colour, of a metallic lustre, and very hard, though seldom capable of giving fire with steel.” Fourcroy tells us, that it is usually composed of layers which cover each other, and are themselves formed of convergent needles, the external part being covered with tubercles; and that it is not only distinguished by the colour, but by the form, as the hæmatites botrytes, in the form of bunches of grapes. Mr. Kirwan tells us, that its structure is either solid, granular, scaly or fibrous; that it occurs in shapeless masses, in a stalactitical form; or, according to Gmelin, crystallized in regular forms, though M. de Lisle denies this. In some places it forms whole mountains, and affords from 40 to 80 *per cent.* of iron. Mr. Gerhard extracted alum from it, which affords a proof of its containing clay; and Mr. Hialm found it also to contain manganese. In its natural state it is not affected by the magnet; but by torrefaction it becomes black and magnetic.

9. Hæmatitical, red, yellow, and brown ochres. These are, by Mr. Kirwan, entitled “hæmatites in a loose form, mixed with a notable proportion of argyl” (clay). They are distinguished, he says, from clays, by containing a larger proportion of martial particles. To this species belong the ores which become brown by calcination, and likewise magnetic. They are sometimes mixed with clay or calcareous earths; in which case these ores effervesce with acids. The hæmatites, or blood stones, have their names, not on account of their external colours, but because, when reduced to powder, they produce a red or blood colour. The yellow hæmatites, however, only produce the same colour by pulverisation. They are productive of very good iron, and are found in great abundance in the province of Galiza in Spain. The inhabitants of Compostella, the capital, make a good commerce of these hæmatites of the hardest kind for the burnishing gold leaves, and various other metals. A dark blue kind, somewhat similar to black-lead, is principally employed for these purposes. They are found in many parts of Europe, sometimes forming whole mountains. The most extraordinary ores of this kind, both on account of their forms and of their various and brilliant colours, are found in the island of Elba near the coast of Tuscany. The crystallized ores are here the most beautiful and the most common, though not to be met with any where else. They exhibit various gradations of the finest colours, as red, violet, blue, green, yellow, brown, and black; inasmuch that, according to Coudrai's expression, they look like so many clusters of emeralds, sapphires, diamonds, rubies, and topazes. E. Peni and Mongez affirm, that these ores are mineralized only by the aerial acid; though Coudrai is of opinion, that they contain sulphur also. Besides these beautiful crystallized ores, this island contains also many others; being indeed little other than a group of iron-mountains. The ores in general produce the very best kind of iron.

10. *Emery, Smyris*, is a grey or reddish iron-ore found in great quantity on the islands of Jersey and Guernsey. It is extremely hard, yielding in this respect to no substance except the diamond itself. It is also very refractory, and for these reasons is not used for the sake of the metal it contains, nor indeed is it well known what proportion is contained in it. “The best sort,” says Mr. Kirwan) is of a dark-grey colour, but becomes

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brown, and in great measure magnetic, by calcination: other sorts are of a rusty reddish-white or yellowish colour. Its specific gravity is from 3.000 to 4.000. It is used in polishing glass and metals: for which purpose it must first be ground down and levigated in mills.

11. The *argillaceous ores*. These comprehend the ochres, and more particularly those mentioned by Fourcroy under the name of *bog-ores* of iron, which are commonly met with disposed in beds, and seemingly deposited by waters. Mr. Fourcroy informs us, that this kind of ore is very often in the form of spherical bodies either regular or irregular. Organic matters, such as wood, leaves, bark, shells, &c. are not unfrequently found in the state of bog ores. This kind of transition seems to indicate an analogy betwixt iron and organic substances. In the wood of Boulogne near Auteuil there is a mine of bog-ore of iron, in which vegetable substances become mineralized almost immediately under our eyes.

Mr. Kirwan distinguishes two principal varieties of these; one found on mountains, and such as are met with in swampy grounds or low lands overflowed with water; both of them very heavy, and some absorbing water like clays.

The Highland argillaceous ochres are either yellow, red, brown, or greyish, indurated and friable, or loose and powdery, or in grains; they are composed chiefly of the red or yellow calx of iron, or of a grey iron-ore called *Torsten*, in a loose form mixed with clay. Hence they often contain manganese or siderite, and in France are said to be mixed with a calx of zinc. They do not obey the magnet before calcination, and rarely after it. They effervesce with acids only in consequence of being mixed with calcareous earths; they are soluble with difficulty in the acids, but the most soluble are the best. The iron produced from them is of very different quality, according to the nature of the ore from which it is produced. To this species belong the hornstone overloaded with iron, and a white iron ore mentioned by Rinman found in Kent. It is mixed with clay or marl, and is scarcely soluble in acids. It affords 47 *per cent.* of brittle iron.

The swampy argillaceous ores, according to Mr. Kirwan, are found in irregular lumps of a brown or brownish-black, and sometimes in round balls, porous or solid, or in flat round pieces, or in grains, and sometimes in slender triangular prisms parallel to each other, and very brittle. It is mixed with clay and extractive, and becomes magnetic by calcination; during which operation it gives out a quantity of aerated volatile alkali, and loses one fourth of its weight. The crude ore affords about 36 *per cent.* of metal, and 50 *per cent.* after calcination. The iron produced from it, at least in Sweden, is that called *coldshort*. According to Mr. Hialm, some sorts of this ore contain 28 *per cent.* of manganese.

12. *Red calcareous iron ore* is found loose in many parts of England, effervesces strongly with acids, and is used as a paint under the name of red ochre.

13. *Martial calamine*. Though calamine is properly an ore of zinc, it sometimes contains such a large proportion of iron as to make it worth while to extract the iron. The ore consists of a mixture of quartz and clay, with the calces of iron and zinc. It is of a moderate hardness, and a yellow, red, or brown colour.

14. *Martial pyrites*. This has its name from its property of giving fire with steel. It is commonly in small red masses, sometimes regularly formed, and usually cubical, spherical, or dodecahedral, though their form varies considerably. Some are brown on the outside, others of the colour of iron, some yellowish, and resembling the ores of copper, even on their surface; but all of them are yellow, and as it were coppery within, and for the most part composed of needles, or pyramids of several sides, whose summits converge to a common centre. The pyrites are commonly dispersed, and particularly in copper mines in the neighbourhood of iron mines, and in clays and

coal mines, the upper stratum of the latter being almost always pyritous. They are all easily decomposed, and yield green vitriol, as is explained under the article CHEMISTRY.

15. *Iron mineralized by arsenic.* This combination takes place either by the combination of arsenic alone with the metal, or in conjunction with sulphur. The former is called in Germany *mispickel*, and *speiss* by the Bohemians; is of a bright white colour, sometimes, though rarely, variegated like a pigeon's neck, and is not easily altered by exposure to the air. It is not magnetic either before or after calcination; it is soluble in acids, and affords arsenic by distillation in the proportion of 30 or 40 *per cent.* and sometimes contains a small proportion of copper and silver. It is frequently found in indurated clay, quartz, spar, schoerl, &c. and mixed with other metallic ores. When this metal contains less than $\frac{1}{10}$ th of arsenic, it is magnetic, according to Scheffer; whence, if the calcination be pushed to a sufficient length, the ore must remain magnetic.

That species of ore which consists of iron mineralized by *sulphur and arsenic together*, contains the white, grey or bluish grey pyrites or marcasite. It is found either in solid compact masses of a moderate size, or in grains, and gives fire with steel. When burnt it affords a blue flame and the smell of arsenic, with orpiment or realgar, instead of pure arsenic by distillation in close vessels. It is not magnetic either before or after calcination, and contains much more arsenic than sulphur.

16. *Native Prussian blue* consists of clay mixed with iron, and coloured with some unknown tingeing substance, generally found in swampy grounds or bogs. It is at first white, but when exposed to the air becomes either of a light or deep blue. By heat it turns greenish, and emits a slight flame, becoming afterward red and magnetic. It is soluble both in alkalies and acids; but the alkaline solution is precipitated by acids, and the acid solution by alkalies. The precipitate at first is greenish, and gradually assumes a white hue, but regains its blue colour on being mixed with vegetable astringents. Mr. Woulfe found this kind of ore in Scotland on the surface of the earth. The greatest part of marshy grounds containing turf, likewise have some of this.

17. The *terre verte*, or green earth, of Verona and Normandy, is used as a pigment, and contains iron in some unknown state, mixed with clay, and sometimes with chalk and pyrites; alum and selenite being likewise accidentally mixed with it. It is soluble with difficulty in acids, is not magnetic before calcination, and becomes of a coffee colour by heat.

18. Mr. Fourcroy informs us, that "it has been discovered some years ago, that iron is often united naturally with the phosphoric acid. The muddy or bog ores are sometimes of this nature: a portion of this compound remaining in the iron gives it the property of being brittle when cold. Iron in this state was called *siderite* by Bergman, and it has since been called *water-iron*."

There are several other kinds of iron ore enumerated by mineralogists; but those already mentioned are the most remarkable.

The following observations on iron in its different states, with an account of the methods of manufacturing it, &c. are extracted from Magellan's Notes on Cronstedt's Mineralogy.

1. Iron is employed in three different states, each having its peculiar properties, by which they are each more particularly applicable to various purposes. The first is *cast iron*, the second is *wrought* or *malleable iron*, and the third is called *steel*.

According to Bergman, cast iron, which may be called *unripe* or *raw-iron*, contains the smallest share of phlogiston. The malleable iron contains the greatest quantity; and the steel a middling share between both, neither so much as the malleable,

nor so little as the cast-iron. This last is called also *pig-iron*, and *yellin* in England.

2. The richest ores of iron are the compact and ponderous, of a brownish, reddish-brown, or red colour. Some of these ores, in colour and appearance, do not ill resemble iron itself; as the grey ores of Derbyshire, and the bluish of the Forest of Dean in Gloucestershire. Most of the Swedish ores are likewise of this kind. Others are blackish, brown, red, yellowish, or rusty-coloured: these are the most common in England and Germany. There is one very singular species of a striated texture, and of a pale yellowish or greyish colour, oftentimes white, and in some degree pellucid; which, although in its crude state it promises nothing metallic, nevertheless, on being moderately calcined, discovers, by the deep colour it assumes, that it abounds in iron. Cramer informs us, that it gives out by fusion from 30 to 60 *per cent.* But some richer ores yield no less than 70 and 80 on the hundred.

3. Different kinds of iron ore are found adhering in some mines to the tops of caverns in form of icicles or stræ, sometimes irregularly clustered together, sometimes hanging down like the bristles of a brush; from whence the name of *brush-iron-ore*. Other particular forms of the iron stone have occasioned a variety of fanciful names, that are met with in some of the metallurgic writers.

4. The iron of Great Britain is made from three different kinds of ores: 1. From the iron-ore called the *Lancashire ore*, from the county where it is found in greatest abundance. This ore is very heavy, of a fibrous or lamellated texture; it is of a dark purple, approaching to a shining black; and when reduced to powder, it becomes of a deep red: it lies in veins like the ores of other metals. 2. The bog-ore, which resembles a deep yellow ochry clay, and seems to be the deposition of some ferruginaceous rivulets, whose currents had formerly been over the surface of those flat marshy plains. It lies in beds of irregular thickness, commonly from 12 to 20 inches, and very various in their breadths from side to side, never being of great dimensions. 3. The iron-stones, however, have no regular appearance, and do not in the least resemble a metal in their external surface. They lie often in beds of great extent, like other stony matters, and are sometimes stratified with seams of pit-coal, forming alternate layers.

5. The ores of iron are commonly calcined previous to the fusion, even the harder ones, though they should contain nothing sulphureous or arsenical, in order to calcine the hard adhering matrices, and render the masses soft enough to be easily broken into fragments of a convenient size for melting. After the mineral is duly prepared, it must be smelted in furnaces of large capacities, from 16 to 25 feet high, and from 10 to 14 wide: the most approved shape nearly resembles that of a hen's egg, with the largest end undermost, below which is a square cavity to contain the melted metal, and at the top a very short vent about 20 inches in diameter. The inner wall is built of fire-stone, which endures very strong heat with little risk of melting, and all the joints are cemented with mortar composed of sand and clay. This is surrounded with more building, which deviates more and more from a circular form, and becomes a square building of about 20 feet at the base, and gradually converges to the top.

6. Near the bottom is an aperture, for the insertion of the pipe of a large bellows, worked by water or by other machines that may produce a strong current of air. Some very powerful ones, as those in the iron works at Colebrook dale and at Carron, consist of two or more iron cylinders, upwards of two feet wide, whose pistons are alternately moved by a small fire-engine or by a water-wheel: but Mr. Wilkinson very ingeniously adapted to his own a large vaulted receiver surrounded by water, which produces a very regular and uniform

blast. Two or more holes are also left ready to be occasionally opened at the bottom of the furnace, to permit at a proper time the scoria and the metal to flow out, as the process may require. Charcoal, or coke with lighted brushwood, is first thrown in; and when the inside of the furnace has acquired a strong ignition, the ore is thrown in by small quantities at a time, with more of the fuel; and commonly a portion of limestone is thrown also as a flux. The ore gradually subsides into the hottest part of the furnace, where it becomes fused, and the metallic parts being revived by the coal, pass through the scoria, and fall to the lower part or bottom of the furnace, where a passage is open for taking off the scum or dross. The metal now in strong fusion is let out by a tap-hole into furrows made on a bed of sand: the large mass, which sets in the main furrow, is called by the workmen a *row*, and the lesser ones *pigs* of iron. Chimney-backs, stoves, garden rollers, &c. are formed of this rough metal, taken out of the receiver with ladles, and cast into moulds made of fine sand."

It is proper to observe, that the excessive and long continued ignition kept up in these furnaces gradually wastes the materials of which they are composed, rendering their sides thinner until at last they become unable to sustain the weight of the melted metal; so that it has sometimes been known to burst out suddenly in a violent and most destructive stream. At certain intervals, therefore, the fire ought to be allowed to go out, whatever may be the expence of rekindling it, and the furnace examined and repaired.

7. The quantity of fuel, the additions, and the heat, must be regulated, in order to obtain iron of good quality; and this quality must likewise in the first product be necessarily different, according to the nature of the parts that compose the ore.

8. Two or three tons, viz. 4000 or 6000 pounds weight of iron, are now run off in 24 hours, at some large furnaces, after the application of the large bellows; whilst scarcely an hundred weight could be obtained in a day before that application, because a large quantity of the metal was left in the dross: hence in some places the slags of different ores, left by old operators in former times, are now remelted to advantage along with fresh ore; and on account of the richness of these old slags of different ores, some people have been misled into the opinion, that the metal was regenerated in them.

9. Peat and turf has been found to answer tolerably well, mixed with charcoal, for the smelting of iron ores; but an attempt to use it on a large scale has at last been found not to answer the expectations that had been conceived from the first trials. Pit-coal, if applied to the same purpose, renders the iron hard and brittle; but this inconvenience is prevented, by previously coking the coal, and employing it in the state of true coke. Cramer, in his *Art of Assaying*, p. 347, says, that pit-coals, kennel-coals, and Scotch-coals, which burn to a white ash like wood, and abound more in bitumen, may be used in the first fluxion of the iron from its ore; and if the iron proves not so malleable as required, this property may be given to it by melting the metal a second time with wood.

10. The best cast-iron, or raw iron, as much freed from heterogeneous matters as the usual process of smelting can effect it, is not at all malleable, and so hard as perfectly to withstand the file.

11. In general the impure cast-iron, as run from the ore, is melted down a second time in another furnace, intermixed with charcoal. A strong blast of air being impelled on the surface of the metal, its fusion is remarkably promoted; the iron thickens into a mass called a *loop*, which is conveyed under a large hammer raised by the motion of a water-wheel. The iron is there beaten into a thick square form, is then heated again until almost ready to melt, and is forged: by a few repetitions

of this process, it becomes completely malleable, and is at length formed into bars for sale.

12. Iron in this state of malleability is much softer than before, and of a fibrous texture. But if it is still crude and brittle after the above process, it shows that there have remained heterogeneous matters, being hidden in its interstices, which must be expelled: for this purpose the iron must be stratified with charcoal-dust within a proper furnace, heaped up in good quantity in strata; then the fire must be blown pretty strongly, so as to bring it to a fusion, which is to be helped by the addition of fusible scorias or of sand. The fire must not be much greater than necessary to make all these melt as equally as possible: to obtain this end, the melted mass must be agitated here and there with poking rods of wrought iron, in order to make every part feel alike the action of the fire and air; and the increasing scorias taken out once or twice.

13. In the mean time, a great many sparkles will be thrown out from the iron, which diminish the more as the iron comes nearer to the desired degree of purity, but they never cease entirely. The burning coals being then removed, and the scoria conveyed out of the fire through a channel made for that purpose, the iron, by lessening the violence of the fire, grows solid, and must be taken out red hot, and tried by striking it with a hammer. If it proves crude still, let the melting be repeated; and when it is at last sufficiently purified, it is to be hammered, and extended various ways, by making it red-hot many times over: this done, it will no longer be brittle, even when cold, as Cramer asserts.

14. Cast-iron has of late been brought into the malleable state by passing it through rollers instead of forging it. Indeed this seems to be a real improvement in the process, as well in point of dispatch, as in its not requiring that skill and dexterity which forgers only acquire by long practice. If the purposes of commerce should require more iron to be made, it will be easy to fabricate and erect rolling machines, though it might be impracticable to procure expert forgers in a short time.

15. This method was discovered by Henry Cort of Gosport, who obtained an exclusive privilege granted by the king's patent. See *Repertory of Arts*, vol. iii. p. 289. By this process the raw or cast-iron is freed from the impurities, which are not discharged in the common methods of rendering this metal malleable; for iron is in itself a simple homogeneous metal; and all iron must become equally good, if it be purified from the heterogeneous and unmetallic particles that are any ways mixed with it.

16. The ordinary method of converting cast-iron into malleable, is, as we have seen, by employing great quantities of charcoal, which furnishes phlogiston, and remetalizes the particles, which are unmetallized and mixed with the heterogeneous matters contained in the fused mass: but in Cort's method there is no need of charcoal, instead of which only sea-coal is employed; because the object is not to remetalize, but only to expel what is unmetallic, instead of endeavouring to restore the calcined parts with charcoal at a great expence, and still leaving the business undone. In this method the iron is only heated and wrought simply by the heat of the flame, instead of being mixed with the burning fuel and ashes, which are not easily disengaged afterwards from the metal. The squeezing it between the rollers, forces out the melted slags from the metallic pores, and brings its metallic fibres into a perfect solidity and close contact, so that they are obliged to cohere much more perfectly to each other than by the interrupted and partial action of the hammer. By the operation of being long stirred, the sulphureous particles are more disposed to be disengaged, and are burned away in the form of blue sparks; the metal then begins to curdle, and to lose its fusibility, like solder

when it just begins to settle ; the metallic particles meeting and coalescing together, much as in the churning of milk, where the cream is separated by the union formed between the fibrous particles of the cheese. The curdles formed into a connected mass become what is called *loops*. The process is as follows :

17. Five or six hundred weight of raw cast-iron (and even of cold-short iron) is brought into a low fusion, on a kind of hearth or low furnace, in which it lies to the depth of about 6 inches. One or two workmen continually stir this fused mass with long iron pokers for about 4 or 5 hours. The heat is then lowered : the men fashion the iron into narrow pieces of about $3\frac{1}{2}$ feet long, and 3 inches square, with long knives or chisels made for that purpose. They are then heated to the welding degree, and hammered to expel and scatter the unmetallic dross. These slabs are then formed to a wedge-point at one end, in order to adapt them to be received between the rollers : they are malleable already, but they contain still some dross.

18. They are then heated again to the hottest welding heat in the air-furnace, and immediately passed through large iron-rollers, turned by a water-wheel, or by horses. If the end presented to the rollers should slip instead of entering, a boy, who stands ready, throws some sand upon the iron, and it goes in easily. Much foreign and heterogeneous matter is squeezed out by the rollers ; and the iron comes out in a purer malleable state. The same heat will serve to pass the iron through two sets of rollers, which are grooved so as to fashion it into nail-rods or other forms according to the required purposes.

19. Various and repeated severe trials have been made in the royal dock-yards of England, in the presence of persons of knowledge and rank, to prove the strength, malleability, and softness or toughness of this new iron ; and it has proved to be equal, and even sometimes superior, to the best Swedish iron. But it is not easy to conceive by what singular fatality so great an improvement in manufacturing this most useful metal has not yet been generally adopted by the iron-masters.

20. Steel is iron in an intermediate state between cast-iron and malleable iron, which is soft and tough. The iron run from some German ores is found to be a good steel when forged only to a certain point.

But the best steel is usually made by cementation from the best forged iron, with matters chiefly of the inflammable kind. Two parts of pounded charcoal and one of wood ashes is esteemed a good cement. The charcoal dust may be made of bones, horns, leather, and hairs of animals, or of any of these ingredients, after they are burned in a close vessel till they are black : these being pulverised, and mixed with wood ashes, must be well mixed together. The iron should be of pure metal, not over thick, and quite free from heterogeneous matters : their flexibility, both when hot and when cold, is a very good sign thereof. A deep crucible, two or three inches higher than the bars, is to receive part of the cement, well pressed at the bottom, the height of $1\frac{1}{2}$ inch ; and the bars are to be placed perpendicularly, about one inch distant from the sides of the vessel and from each other. All the interstices are to be filled with the same cement, and the whole covered to the top with it ; then a tile is applied to cover the vessel, stopping the joints with thin lute.

21. The crucible is then to be put in the furnace, and a strong fire is to be made, that it be kept moderately red-hot for six or ten hours together ; at the end of which time the bars will be found converted into steel. If the cementation be continued too long, the steel will become excessively brittle, incapable of being welded, and apt to crack and fly in forging. On the contrary, steel cemented with absorbent earths is reduced to the state of forged iron.

22. Steel is further purified for making the nicest kinds of

instruments, such as lancets, pen-knives, razors, and various pieces for the best kind of watches, time-keepers, or chronometers, and astronomical regulators. This purification of steel consists in melting it again with a strong but regular fire in a crucible, the better to free it from the heterogeneous parts, and little flaws that may be contained in it. It is then called *cast-steel* when fused into bars : which name, however, does not imply that the pieces, for instance the cast-steel razors, have been really cast in their present shape ; for they must be forged from the bar after it is cast. The fusion must have been perfect, so that the metallic parts be rendered uniform. The metal diminishes a little by this process ; for a bar of common steel 36 inches long will afterwards produce another only of 35, if properly fused and purified.

23. The cast-steel will not bear more than a red heat ; otherwise it runs away, like sand, under the hammer, if the heat is pushed to the welding degree. Dr. Watson says, that this manufacture of cast-steel was introduced at Sheffield only about 40 years ago by one Waller. This man was still living about the year 1765 ; he dwelt at St. Bartholomew's close, and was a galloon wire-drawer by trade. The difficulty of procuring small cylinders of good steel to flatten the wire for lace-work in his business, whose defect proceeded from the bad texture of the steel, set his imagination on the enquiry after a method of purifying the metal to a greater perfection : and he thought that a new fusion of it was the most likely to accomplish his views. After some trials, he at last succeeded ; but it was soon known to others, who got the advantages for themselves ; of which ill fate the real inventor very bitterly complained till the end of his life. His own name was even forgotten, as one Huntsman practised this art to such an extent, that cast-steel was known under his sole name afterwards.

24. But before this discovery made by Waller in England, this kind of steel was made already in Germany, as Watson asserts ; and from thence some small quantities were brought to England at a considerable price. Since that time this branch of business is carried on advantageously at Sheffield ; for the manufacturers there collect a great abundance of broken tools, and old bits of steel, at a penny a pound, which, after fusion and purification, sell for 10 or 12 times as much.

25. It is a valuable property of iron, after it is reduced into the state of steel, that, though it is sufficiently soft when hot, or when gradually cooled, to be formed without difficulty into various tools and utensils ; yet it may be afterwards rendered more or less hard, even to an extreme degree, by simply plunging it, when red hot, into cold water. This is called *tempering*. The hardness produced is greater in proportion as the steel is hotter and the water colder. Hence arises the superiority of this metal for making mechanic instruments or tools, by which all other metals, and even itself, are filed, drilled, and cut. The various degrees of hardness given to iron, depend on the quantity of ignition it possesses at the moment of being tempered, which is manifested by the succession of colours, exhibited on the surface of the metal, in the progress of its receiving the increasing heat. They are the yellowish-white, yellow, gold-colour, purple, violet, and deep-blue ; after which, the complete ignition takes place. They proceed from a kind of scorification on the surface of the heated metal.

26. A bar of clean white steel may be made to assume all the above colours at once, by placing one end in the fire, and keeping the other end out, which is supposed of a proper length to remain cold.

27. These colours serve as signs to direct the artist in tempering this metal. For though ignited steel, suddenly quenched in very cold water, proves excessively hard and brittle ; yet it may be reduced to the required degree of temper by heating it till it exhibits a known colour. This is the method employed

in this process by the artists. As soon as the piece of steel is completely ignited, they plunge it in very cold water; and as soon as it loses its fiery appearance, they take it out, rub it quickly with a file, or on a plate covered with sand, that it may have a white surface. The heat, which is still within the metal, soon begins to produce the succession of colours. If a hard temper is desired, as soon as the yellow tinge appears, the piece is dipped again, and stirred about in the cold water. If the purple appears before the dipping it, the temper will be fit for tools employed in working upon metals; if dipped while blue, it will be proper for springs, and for other instruments fit to cut all sorts of soft substances; but if the last pale colour be waited for, the steel will not be hard at all.

28. It deserves notice, that a piece of iron is rendered considerably warm by hammering, so as even to become red-hot. But after the iron has been completely hammered once, it is asserted that it cannot be rendered again red-hot by the same operation, because no further compression can then be made. Hard steel is the only metal that, being struck slantwise with the sharp edge of a flint, or of another hard stone, produces sparks of fire.

29. Iron is often manufactured so as to be 150 times, and even above 630 times, more valuable than gold. On weighing some common watch pendulum-springs, such as are sold at half a crown by the London artists for common work, ten of them weighed but one single grain. Hence one pound avoirdupois (= 7000 gr.) contains ten times as many of these springs; which, at half a crown a-piece, amount to 8750l. sterling. The troy ounce of gold sells at 4l. sterling, and the pound (= 3760 gr.) at 48l. sterling, which gives 58,33 (or 58l. 6s. 7d.) for each pound avoirdupois of gold: and of course $\frac{8750}{58.33} = 150$. But the pendulum-springs of the best kind of watches sell at half a guinea each; and at this rate the abovementioned value must be increased in the ratio of 1 to 4.2; viz. of half a crown to half a guinea: which will amount to 36,750l. sterling; and this sum divided by the value of the pound of gold gives above 630 to the quotient.

We may not improperly introduce in this place an extract from the specification of Mr. Purnell's patent, granted in the year 1787, for a method of preparing, shingling, and welding iron, with pit-coal from the ore, by the help of a machine, which is said to produce better iron, more in quantity, with less waste both of metal and fuel, than can be effected by any other method. After some preliminary remarks, Mr. Purnell proceeds thus:

"I use the common air or reverberatory furnace, in manner as is practised at the common iron-founderies; in which the metal must be brought into the most equable and perfect state of fusion, by being agitated here and there in the fire, so that every part may receive such effect from it, that not the smallest particle may remain unmelted, or in an unfused state: and, after that is completed, the heat must be abated by slow degrees, (still keeping it stirred and separated) so that, as it cools gradually, it may be taken from the furnace in lumps, loops, or pieces, of about the weight of fourteen pounds, more or less, (as it may happen, or as the power of the rollers hereinafter described may best overcome) on shovels made light, with their edges turned up, and rather dished in the middle, the better to prevent the hot metal falling off, whilst conveying from the furnace-mouth to a cast iron plate, placed on the floor, between the furnace-mouth and rollers, on which it must be laid down to receive a few blows from a common sledge-hammer, by a labourer placed ready for that purpose, to bring it into somewhat of the shape of a wedge; when it must, with all possible dispatch, be taken up by a man, who must attend before the rollers, with a shovel, like to that before described, or other such

tool or instrument, and conveyed to an iron plate, placed nearly in a direct line with the centre of a pair of iron rollers sixteen inches long by fifteen in diameter, or of such other dimensions as the force of the machinery used may render necessary, to be worked by steam, fire, or water; on which plate it is laid, and a blow or blows must be instantly given it by the edge of the said shovel, or other such tool, against the thickest edge or side, the better to force it to enter betwixt the rollers (always observing that the thin edge of the lump or loop be presented to pass first); and whilst this first lump or loop is passing betwixt the rollers, and falling into a cistern through which a continual stream of water is made to pass, another such lump or loop must be prepared and brought forward in regular succession, until the whole charge of one furnace be rolled; which, in quantity, may be from three to five hundred weight, more or less, and which may be made to pass between the said iron rollers in about fifteen minutes; which, in the common method used, would take up much longer time, and be attended with a greater expence. But, should a still greater dispatch in the rollers be required, a much larger quantity may be made to pass between a pair of rollers in the same given time, by working them abreast, or parallel to each other, and letting the lumps or loops fall between the rollers whilst in motion, aided by a slight blow from a light sledge-hammer, or even generally by their own weight. In which latter case, the dispatch will be equal to the expedition with which the metal can be made to pass to the rollers, either by means of the shovels, as before described, or by iron troughs and rakes, to convey it from the furnace to the rollers. The furnaces to be placed in the most convenient situation to the rollers, that the hot metal may have but a short distance to be conveyed to them from the furnaces, that it may pass between them in a proper state of heat, so that the rollers, by their superior force, and uniform pressure on all the parts of the hot crude metal, may squeeze, force out, and separate from the true metallic part, the greatest possible quantity of cinder, or obnoxious unmetallic earth; and which it does in a much superior degree to any tilting forge, or other hammer and anvil, be their weight or force what it may."

Under the article ELECTRICITY, we have taken notice of a curious experiment of burning iron in dephlogisticated air; of which an account is also given under AEROLOGY, where the experiments of Dr. Priestley are related. In the last number of the Chemical Annals we find the subject particularly treated of by M. Lavoisier. "The beautiful experiment of Mr. Ingenhoufz (says he) is now well known. A piece of very fine iron wire is turned into a spiral form; one end of it is fixed in a bottle cork; to the other a piece of agaric is fastened: when this has been done, a bottle is filled with vital air, the agaric is lighted, and it is then, along with the iron wire, quickly introduced into the bottle, which is stopped with the cork. As soon as the agaric is plunged into the vital air, it begins to burn with a dazzling light; the inflammation is communicated to the iron, which also burns, throwing off bright sparks that fall to the bottom of the bottle in round globules. These globules become black as they cool, and preserve some remains of their metallic lustre. The iron thus burnt is more brittle than glass itself; it powders easily; is attractable by the magnet, but less so than before the operation."

M. Lavoisier, in order to observe more fully the changes which happened to the metal on this occasion, repeated the experiment upon a scale considerably larger. He immersed chips of iron turned into a spiral form into a vessel filled with pure air which contained about 12 quarts; fixing to the end of each chip a small bit of agaric, and a particle of phosphorus weighing scarce $\frac{1}{16}$ th of a grain. Having set fire to the phosphorus and agaric, the iron is wholly consumed to the very last

particle with a bright white light resembling stars in rockets. The heat in this combustion melts the iron, which falls down in globules of different sizes. In the first instant of the combustion there is a slight dilatation of the air; but this is succeeded by a very rapid diminution; and when the quantity of iron is sufficient, and the air very pure, almost the whole gas is absorbed. Our author recommends only small quantities of iron to be burnt at a time; because the heat produced by its combustion is so great, that the glass is apt to fly. A dram, or a dram and an half, is sufficient for a jar holding four gallons, which ought to be very strong in order to resist the weight of the mercury with which it is to be filled. The increase of weight in the iron, by being burnt in this manner, is, according to our author, about 35 per cent. It is then in a state of ethiops, and may be powdered in a mortar. When the air in which the combustion has been performed is very pure, there is no great difference betwixt that in which the iron has been burnt and the original quantity, excepting only a small mixture of fixed air from the little portion of charcoal contained in the iron.

In this work also we find some observations on the solubility of iron in pure water from Crell's Annals for the year 1788. It has generally been supposed that pure water is incapable of dissolving or holding iron in solution: but the fact seems now to be established by the following experiment: A pound of fresh distilled water was poured upon two ounces of iron-filings into a narrow-necked glass retort; the vessel was then put in a sand heat, and the liquid evaporated to one-half; after which the mouth was slightly stopped with a cork, and the matter left to digest in a gentle heat. On opening the vessel it was found that the water had become styptic, and had a ferruginous taste; whence it appeared that part of the metal was dissolved. Phlogisticated alkali had no effect upon this solution until a few drops of pure distilled acetic acid were added, when a little prussian blue fell to the bottom. Soon after making this experiment, our author met with a natural mineral water which contained iron in solution, though it would not precipitate any thing until a few drops of acid were added. This solubility of iron in pure water has been also taken notice of by M. Landriani and M. Monnet.

Iron is easily calcinable by fire, and is soluble in all the acids, even that of fixed air. By exposure to the atmosphere it is attacked by the pure part of the surrounding fluid, which thus becomes converted into fixed air, the metal in the mean time being changed into a yellowish-brown powder called *rust*. Common iron is much more subject to rust than steel; and this facility of calcination renders it a matter of great importance to discover some effectual method of preventing it from taking place. Various compositions have been recommended, but none have been found more effectual than common oil. As the use of this, however, must be on many occasions troublesome and disagreeable, a still more commodious method has been fallen upon. It is known that the metal, after having undergone that kind of calcination in which it combines with the base of dephlogisticated air, or begins to combine with it, is not subject to rust. By giving it a coating of this kind, therefore, it is effectually preserved from any action of the air; and this is done by heating it till it assumes a blue colour, which indicates a partial calcination on the outside: and thus utensils are made capable of being preserved from rust for a long time; though even these, when exposed wet, or even a long time to the atmosphere, will be covered with rust, and decay like others. For the chemical properties of iron, see CHEMISTRY; for its electrical and magnetical ones, see ELECTRICITY and MAGNETISM.

IRON-Bridge.—Among the great variety of purposes to which iron has been applied, is that of the construction of bridges;

an art of late years brought to an extraordinary degree of perfection.

The bridge at Colebrook-dale has been long considered as a most curious structure; but the following account of similar inventions, as they are described in the Repertory of Arts, will shew how very considerable have been the subsequent improvements in the construction of iron bridges.

Mr. Burdon's elegant bridge across the Wear at Sunderland, is a monument of fine taste, ingenuity, and public spirit. We shall here describe the principles of his invention from the specification of the patent granted to him for "a certain mode or manner of making, uniting, and applying, cast-iron blocks to be substituted in lieu of keystones, in the construction of arches."

"I the said Rowland Burdon do hereby declare, that my invention consists in applying iron, or other metallic compositions, to the purpose of constructing arches, upon the same principle as stone is now employed, by a subdivision into blocks, easily portable, answering to the keystones of a common arch, which, being brought to bear on each other, gives them all the firmness of the solid stone arch; whilst, by the great vacuities in the blocks, and their respective distances in their lateral position, the arch becomes infinitely lighter than that of stone; and, by the tenacity of the metal, the parts are so intimately connected, that the accurate calculation of the extrados and intrados, so necessary in stone arches of magnitude, is rendered of much less consequence. Fig. 1. pl. 21. represents a block of cast iron, 5 feet in depth from A to A, and four inches in thickness, having three arms B, B, B, and making a part of a circle, or ellipsis: the middle arm is 2 feet in length from B to C, and the other two are in proportion. On each side of the arms are grooves ($\frac{3}{4}$ of an inch deep, and 3 inches broad) for the purpose of receiving malleable or bar iron; and in each arm are two bolt-holes. D, fig. 2. represents two of these blocks placed together, and the joints confined to their respective positions by the bar-iron on each side of the arms, as at E, E, E; which, with other similar blocks, so united and bearing upon each other, become a rib. Fig. 3. and F, F, fig. 2. are hollow tubes, 6 feet long, and 4 inches in diameter, having shoulders at each end, with holes answering to those of the blocks. G is a block of another rib, connected with the former by the tubes F, F, placed horizontally. Through the holes in the shoulders and arms of the block and bar-iron are bolts (fastened with cotters or forelocks), as at H, H, H, H. The blocks being united with each other in ribs, and the ribs connected, and supported laterally, by the tubes, as above described, the whole becomes one mass, having the property of key-stones cramped together. The blocks and tubes above specified are those intended to be used in the construction of the arch of the bridge, now erecting by me, across the river Wear, at Wearmouth, near Sunderland, in the county of Durham. The arch is a segment of a circle, whose chord or span is 236 feet; its versed sine or height 34 feet; and its breadth 32 feet, consisting of six ribs: but the sizes of the blocks, tubes, and other parts, with the number of ribs and arms in the blocks, must be suited to the dimensions, form, and use, of the arch."

We now proceed to transcribe Mr. Burdon's account of the bridge at Sunderland, the first wherein that principle has been adopted.

"From the increasing population and trade of Sunderland and the two Wearmouths, the ancient ferry, which was almost in the centre of the harbour, was become very insufficient, and unsafe; inasmuch that frequent instances occurred of the loss of lives, independent of the constant delay and disappointment occasioned to all descriptions of people.

"Under these circumstances, Mr. Burdon, who had previously procured a turnpike-road from Stockton to Sunderland,

was early in expressing his wishes for the accommodation of a bridge across the Wear, as near Sunderland as possible. Being returned to parliament by the county of Durham, in the year 1790, he began to move in the business during the ensuing year, and an act of parliament for a bridge was, with some difficulty, obtained in 1792. At first a stone bridge was proposed, of 200 feet span, and 80 feet to the crown of the arch; but, the plan, with the estimate, being referred to persons of skill, the extent of expence appeared beyond all reasonable bounds; and, upon searching for foundations, none were to be found within the limits of the space covered by the tide, which flowed between rocky shores distant from each other in the narrowest part about 240 feet. Another difficulty also arose from the situation being so near the mouth of the river, and perpetually occupied by the craft of the coal, lime, and other trades, which could not admit even a momentary interruption. From the attempts at constructing bridges of iron by the Colebrook-dale Company, and also by Thomas Paine, Mr. Burdon, though he disapproved of their principles, conceived the idea of making use of that metal; adhering however to the ancient construction of bridges, by the subdivision of the parts of the arch in the manner of key-stones, and taking advantage of the ductility and tenacity of iron, to produce an arch of that metal, at least fifteen times lighter than a corresponding arch of stone, and capable of being put together upon an ordinary scaffold, instead of an accurate centre, in an infinitely less space of time.

"After having caused an experimental rib to be cast, and set up, by Messrs Walkers of Rotherham, under the direction of Mr. Thomas Willon, Mr. Burdon brought forward a proposal to the town of Sunderland and the county, of constructing a bridge, on his principles, over the Wear, between the Wear-mouths, immediately adjoining to Sunderland and its harbour. His proposition was adopted; and the foundation-stone was laid on the north side, on September 24, 1793. To the superintendence of the execution of the work Mr. Thomas Willon of Sunderland was appointed, through whose indefatigable zeal the bridge was rendered passable, and opened for the accommodation of the public, in the presence of a vast concourse of people, on August 9, 1796. The arch is a segment of a large circle; its span is 236 feet; the height from low water to the spring of the arch is about 60 feet; and the versed sine 34; producing so flat an arch, that ships of 200 or 300 tons may pass under it, with equal facility, within fifty feet on either side of its centre; having 94 feet clear at low water, and abundant depth in the mid-stream. The bridge consists of 6 ribs, at 5 feet distance from each other: the spandrels are composed of cast-iron circles. The 6 ribs were put together over the river in the short space of 10 days. The superstructure is of timber, planked over to support the carriage-road, which is composed of marble, limestone, and gravel, with a cement of tar and chalk immediately upon the planks, to preserve them. The whole width of the bridge is 32 feet; and on each side is a footway of substantial flags, having an iron palisade, with lamp-posts of timber at intervals. The weight of the arch is calculated, to exceed 900 tons, of which 260 tons are iron. Of 28 parts of the iron, 23 are cast, and 5 are wrought iron.

"The expence of constructing the bridge will amount to above 26,000*l.* of which 4000*l.* was subscribed by different gentlemen, and the remainder by Mr. Burdon. The tolls, which are the same as those of the ancient ferry, are subjected by the act to pay 5 *per cent.* on the capital, if equal thereto; and all accumulations beyond that are to go to discharge the capital."

The success of this undertaking will no doubt induce others to construct public bridges on similar principles and with similar materials.

IRON-Moulds, and spots of ink in linen, may be taken out by

dipping the stained part in water, sprinkling it with a little of the powdered salt of wood-forrel or of lemons, then rubbing it on a pewter plate laid over a basin of hot-water; and lastly washing the spot out with warm water.

IRON-Sick, in the sea language, is said of a ship or boat, when her bolts or nails are so eaten with rust, and so worn away, that they occasion hollows in the planks, whereby the vessel is rendered leaky.

IRON-Wood, in botany. See the article SIDEROXylum.

IRON-Work, in botany. See the article SIDERITIS.

IRONY, in rhetoric, is when a person speaks contrary to his thoughts, in order to add force to his discourse; whence Quintilian calls it *diversiloquium*. Thus, when a notorious villain is scornfully complimented with the titles of a very honest and excellent person; the character of the person commended, the air of contempt that appears in the speaker, and the exorbitancy of the commendations, sufficiently discover the dissimulation of irony. Ironical exhortation is a very agreeable kind of trope; which, after having set the inconveniences of a thing in the clearest light, concludes with a feigned encouragement to pursue it. Such is that of Horace, when, having beautifully described the noise and tumults of Rome, he adds ironically—
"Go now, and study tuneful verse at Rome!"

IROQUOIS, the name of five nations in North America, in alliance with the British colonies. They are bounded by Canada on the north, by the American States of New York and Pennsylvania on the east and south, and by the lake Ontario on the west.

IRRADIATION, the act of emitting subtile effluvia, like the rays of the sun, every way. See EFFLUVIA.

IRREGULAR, something that deviates from the common forms or rules: thus we say, an irregular fortification, an irregular building, an irregular figure, &c. In grammar, this term denotes such inflections of words as vary from the general rules; thus we say, irregular nouns, irregular verbs, &c. The distinction of irregular nouns, according to Mr. Ruddiman, is into three kinds, viz. variable, defective, and abundant; and that of irregular verbs into anomalous, defective, and abundant.

IRRIGATION, the improvement of land by watering it artificially. We draw the following valuable remarks on a subject of so much importance to agriculture, from the General View of the Agriculture of the County of Stafford; drawn up, for the Consideration of the Board of Agriculture, by William Pitt, Esq. of Pendeford, near Wolverhampton.

"Irrigation, or the improvement of land by watering, is, or may be, a very important and extensive part of agriculture; and though the advantages to be derived from it are generally admitted and well known in this county, at least by all intelligent farmers, yet it is by no means in general carried to the extent of which it is capable; many streams being suffered to glide quietly down their own channel, which might easily be drawn over the adjoining lands, to their great improvement. This omission is in part owing to neglect; in part to the jealousy of millers, and other persons interested in the streams; and, in some degree, to the best methods of extending this application of water not being generally and sufficiently understood. The industry of many individuals is, however, very properly and successfully exerted in this very commendable species of improvement.

"Respecting a system for irrigation, no general one can apply to particular cases: different modes of spreading the water must be adopted, according to different circumstances of situation, and form of surface. In all cases where a stream naturally falls down a valley, and the sides of such valley consist of easy and regular declivities, the best way undoubtedly is to draw a sufficient quantity of water nearly upon a level, along a main carrier; such water to be let out of the said main car-

rier, at pleasure, by sluices constructed in different places in the sides thereof, into floating gutters; such floating gutters being cut on a level along the sides of the declivities, one below another. These floating gutters will collect the water from the spaces of land above them, and, if well constructed, deliver it very regularly upon the spaces below each of them respectively. The watering in this case will require very little attendance, except that of opening and closing the sluices in rotation, so as to irrigate different parts of such lands successively. The gutters too will require an annual cleansing, or scouring-out, otherwise they will choke and grow up with grass.

"The particular mode of action, or operation, by which land is benefited by watering, has not perhaps hitherto been satisfactorily explained; yet it is an established and well known fact, that all waters (except such as are highly putrid) produce a good effect upon land, in some degree proportioned to their rapidity or briskness of motion. Thus, common water, suffered to stagnate upon, or dribble in small quantities over land, will encourage the growth only of rushes, seg-grass (*carex*), and other coarse aquatics, and weaken, if not destroy, the finest and most valuable grasses. The same water, driven over the same land with a brisk motion, and the surface left to dry at intervals, and exposed to the sun and atmosphere, will have a directly contrary effect; the valuable grasses will flourish, and the aquatics be weakened or destroyed. Hence it should seem, that the good effects of watering are in part produced by mechanical operation, by moistening and tendering the surface; which circumstance, combined at intervals with the effects of the sun and atmosphere, brings into action the latent principles of vegetation in plants; which principles would have lain dormant, under the influence of chilling or stagnant water; or would have been locked up by the matting of turf on the surface, had not such turf been softened, and made easily penetrable, by moistening its surface. The coarse aquatics, being hardier, vegetate in a less degree of heat; they seem intended by nature to fill up those vacancies which are yet unprepared for the production of the more valuable tribes, upon this principle in her vegetable œconomy, that a bad plant is better than none; yet, upon the proper application of human industry, they always decline, and give way to those of superior value.

"Every one knows the necessity there is (previous to improvements by irrigation) of discharging the stagnant water from, or from near, the surface of all lands intended to be so improved, by hollow drains or otherwise.

"As the benefit to be derived from irrigation depends so much upon the watering being effected with a brisk motion, and not continued for too long a time, the great desideratum in this species of improvement seems to be the introduction of reservoirs, constructed so as to contain large quantities of flood water; which water, so collected, may be successively, and at pleasure, distributed upon any land below its surface, and continued with such velocity, and for such length of time, as may be thought proper.

"This idea, as applicable to agriculture, is, I believe, novel, and may be treated as visionary; but I am so thoroughly convinced of the great advantages to be derived from it, that I will venture a prediction of its being, in some future time, practised to a great extent. The practice will be much facilitated by the construction of dams being so well and so commonly understood, in consequence of the number of navigable canals which have been, and are still executing. A reservoir of a few acres, and of two yards average depth, may be constructed at from ten to twenty pounds *per acre*, according to circumstances of situation. Such a reservoir as a fishery (under proper management) would be equal or superior in value to an equal breadth of land, and the surface water, to a certain depth, might be drawn down, for the purpose of irrigation, at pleasure.

"Upon this subject of water, the following extensive idea is thrown out by Mr. Jessop, an ingenious gentleman, high in his profession as an engineer; which is, that nine parts in ten of the waters of the kingdom at present run away in waste, great parts of which might be usefully employed; nay farther (putting expence out of the question), that every stream in the kingdom may be made to run equally through the whole year. This position, however extraordinary, is easily demonstrable; for, if upon any given stream one or more reservoirs be made, capable of containing its flood water, and through the dam or dams be laid a pipe or pipes, whose apertures will just discharge the average produce, the business is done. And though there may be no probability of this business being ever brought to so great a nicety, yet hence some idea may be formed of the prodigious extent to which improvements by water may be carried.

"With this subject, and that of forming reservoirs for the purposes of agriculture, is connected another of great importance in domestic and commercial œconomy; namely, the having an extensive command of the application of water, to all mechanical purposes wherein such application will answer better than for irrigation of land, and thus, as it were, arresting every drop of water that falls from the heavens, and rendering it, in the most extensive way, subservient not only to the immediate subsistence of man and beast, and the improvement of land, but even having the residue solely at command, for the purpose of shortening manual labour: such a system would certainly be an important addition to the powers required in many of our mechanical operations, and of great importance in a manufacturing country."

The following are Mr. Jessop's observations on the use of reservoirs for flood-waters:

"The rapid improvements (says he) which have for some years past been made in the agriculture and commerce of this country, and the happy effects derived therefrom, naturally excite a desire to investigate every means by which they may be continued and increased.

"Among the many causes which have combined to promote our prosperity, the facility of intercourse by inland navigation is a great and leading feature. All unite in admitting this as a general position; but many, from private motives, or mistaken opinions, have too often prevailed in preventing the execution of useful projects, which, if they could have been effected, would have greatly contributed to the national benefit derived from those already established.

"Among the obstacles that stand forward, none are more conspicuous, or more generally urged, than the want of water in dry seasons. It usually happens, that where canals are most wanted, manufactories, or agriculture, have already taken possession of the ground, and occupied the streams of water; it is plainly to be foreseen, therefore, that, unless some means are devised to reconcile this competition, those desirable improvements must be crippled in their growth, and stop long before the age of maturity.

"It can hardly have escaped any one's observation, that streams of water used for the purpose of working mills, or the more valuable purpose of watering meadows (in the few instances where this has been practised), while they have a scanty supply in summer, generally discharge in winter such superabundance as frequently to do material injury.

"There are, in some parts of this island, exceptions to this general position. Where the soil is porous, and the *substrata* so open as to absorb the rains as they fall, there are no floods: the pores and fissures of the earth form reservoirs or regulators to the streams; they preserve the winter waters, and so equalize the discharge, that there is but little difference between their winter and summer state; but in clay or other similar soils so little is absorbed, and so much suddenly glides off from the sur-

face, that the extremes of scarcity and exuberance are the necessary consequences.

"It is now well understood, that all natural springs derive their supply from the waters of the atmosphere, and they may fairly be considered as the discharges of natural reservoirs; it is immaterial whether those reservoirs may be composed of large cavities, or minute fissures.

"Leaving expence out of the question, it is possible to conceive (however extravagant the idea may appear) that the waters of all rivers might, by art, be nearly equalized throughout the year; but it will be sufficient to prove that this is practicable if applied to small rivulets or brooks, particularly where nature holds forth a temptation, by furnishing deep ravines, or capacious hollows on the surface of the ground, capable, at a moderate expence, of being made to contain large quantities of water.

"We are taught, from the simple instinct of animals, the provident lesson of storing up the superabundant supplies of one season for the wants of another. Necessity has compelled mankind in many countries to follow this example: in hot climates the inhabitants could hardly exist, without storing up the waters of winter for their use in summer. At Alicant the king of Spain has made a reservoir, the water of which, for the uses of summer agriculture, brings him in a revenue of 2000*l. per annum.*

"There are instances, in this country, where canals are in want of water in summer; while the brooks that supply them discharge floods in winter, in one day, sufficient for the supply of the whole year.

"Those who entertain doubts of the practicability of making reservoirs sufficient for the supply of canals, state their objections under three heads: the expence; the want of sufficiency of water; and the uncertainty of making such reservoirs capable of retaining it.

"When the necessary magnitude is ascertained, the expence is a subject of plain calculation; and it is easy to determine whether the project, to which it is to be applied, will bear the expence. There have been several instances, where the expences of repelling an opposition from mill-owners to a bill in parliament, would have been more than enough to have made sufficient reservoirs.

"Whether they can be filled with water may be known before they are undertaken, by an enquiry and measurement of the discharge in winter.

"The waste of water from a reservoir is in two ways: by exhalation and by leakage. The first, in a dry summer, would consume about nine inches in depth from the surface: making the head nine inches higher than otherwise necessary would compensate for this. The leakage would be in few cases (where it would be prudent to attempt the scheme at all), even upon small streams, more than equal to the summer supply; and whether the water be discharged by leakage, or by a pipe or artificial discharger, if they shall both discharge into the same channel, it is not very material. In clay, or other soils where rushes grow, there will be no sensible leakage; in soils more open, the pores of the soil would be an extension of the reservoir; and, in cases where it might be necessary to discharge constantly from the reservoir a quantity equal to the summer stream, it would for a time supply that discharge.

"Even in extreme cases of leaky soils, if there were any sudden floods, the reservoir would at least prevent their sudden discharge. but, where the soil and strata are so close as to absorb little, and cause sudden floods (and it is to these cases that reservoirs are peculiarly applicable), there is little reason to apprehend leakage.

"The writer of this has lately had an opportunity of experiencing the effect of a small reservoir, not yet completed, as a

regulator to a stream. It covers at present about twenty acres, and is made on a small brook, which, in dry seasons, does not furnish more water than would run through an aperture of an inch in diameter, but is subject to floods, which can hardly be discharged by a pipe of three feet in diameter.

"There is fixed under the head of it an iron pipe of six inches bore, which during the last winter has almost constantly been open; and discharged a quantity no otherwise unequal than from the difference of pressure by the rising and falling of the water in the reservoir, at the different intervals of rainy and fair weather; and, when the reservoir shall be enlarged, on the one hand, the meadows below will never be overflowed, and, on the other hand, the reservoir will furnish, in the dry part of the summer, *at least twenty times* the quantity of water daily that the brook would otherwise afford.

"There is now depending in parliament a bill for making a navigable canal through the vale of Belvoir to the town of Grant-ham, where the soil is almost wholly a firm tenacious clay, and will not require above half the water to supply it which is necessary for canals in other instances.

"That country is subject to an extreme scarcity of water in summer, and to a great superabundance in winter; and every circumstance is favourable to the intention of supplying the canal by artificial reservoirs. It is therefore earnestly hoped, that those who might be induced by their doubts to repel the intention (under the idea that, because no canal hath hitherto been totally supplied by reservoirs, therefore it must be impracticable), will give some credit to those who, on well-grounded information, have advised the measure, and that they will suffer it to be effected.

"It is also hoped, that the execution of a canal upon this system may tend to promote the extension and continuance of those improvements in commerce and agriculture, on which so greatly depends the prosperity of this county; and which, in many instances, have been already checked, by neglecting to employ the assistance of art in remedying the defects, or rather in using or improving the bounties of Nature."

Mr. Pitt concludes his remarks in the following words:

"Farther, respecting the particular subject of applying water to the improvement of land (says he), though this practice is by no means carried to the extent of which it is capable, and large quantities of flood waters are lost (which, in the tenacious clay-soils that abound over a considerable part of this country, can be retained in no other way than by artificial reservoirs), yet considerable exertions are made in this business by many persons, and omitted by few who have the means of doing it; almost every occupier, who has a stream through his meadows, bestowing considerable attention to it in floods. Amongst others, my neighbour Mr. Miller, of Dunstall near Wolverhampton, has upwards of one hundred and eighty acres of land capable of irrigation; and when water abounds, it is applied to this purpose in various ways. Upon his farms are two mill-ponds, and the mills kept in use in his own hands. The jealousy of the millers below, upon the same stream, prevents his applying it to this purpose at any time except when there is plenty of water; on which occasion he often rakes up the mud of his mill-ponds, by small narrows dragged in them to and fro by ropes, and the mud is by this means sent in the water over the land; which water is drawn, in floating gutters, to every part of the land the level will admit; and the consequence is an early and plentiful hay-harvest, often after spring-grazing. There are few instances, in this county, of land formed artificially for the purpose of receiving water by irrigation, by being laid in broad ridges; and the few I have seen would certainly induce any attentive person to reject the method. The soil is seldom left equally upon the land; and the length of time lost, before a good turf can be restored, is a great objection to the

practice; and, as the water may, in almost all cases, be as well applied upon an even surface variously disposed, as land often is by nature, I think such mode of application is to be preferred to breaking the turf, and giving it a new form. Upon the estate of Lord Bagot, adjoining Tedbrook, I observed a considerable tract of formerly morassy land, after draining and being made sound, prepared for irrigation in a very ingenious way: without altering the natural disposition of the turf, the business was effectually done, and meant to be gradually and progressively extended down the valley. At Stoke, near Stone, about fifty acres of meadow-land are watered in a very superior style, from the Trent, and from land floods, by Messrs. Jenkinson. Here the main gutters or carriers are constructed with some fall down the land; and from them are cut sideways a proper number of floating gutters, upon an exact level. Below each of these floating gutters, in the main carriers, are fixed wooden trunks laid in a puddle, with a sliding paddle to each; by means of which the water is either kept back along the floating gutters, and so forced upon and over the land, or drawn down the main gutters, and off the land at pleasure: the gutters are generally constructed deep enough to drain the land, when not used for floating. These meadows have been much improved by this practice, which commenced about seven or eight years ago; before which, I was informed, they were of little value: but at present, after spring-grazing, they produce a full crop of hay, and are improving every year."

IRRITABILITY, in anatomy and medicine, a term first invented by Glisson, and adopted by Dr. Haller, to denote an essential property of all animal bodies; and which, he says, exists independently of and in contradistinction to sensibility. This ingenious author calls that part of the human body *irritable*, which becomes shorter upon being touched; *very irritable*, if it contracts upon a slight touch; and the contrary, if by a violent touch it contracts but little. He calls that a sensible part of the human body, which upon being touched transmits the impression of it to the soul: and in brutes, he calls those parts sensible, the irritation of which occasions evident signs of pain and disquiet in the animal. On the contrary, he calls that insensible, which, being burnt, torn, pricked, or cut till it is quite destroyed, occasions no sign of pain or convulsion, nor any sort of change in the situation of the body. From the result of many cruel experiments he concludes, that the epidermis is insensible; that the skin is sensible in a greater degree than any other part of the body; that the fat and cellular membrane are insensible; and the muscular flesh sensible, the sensibility of which he ascribes rather to the nerves than to the flesh itself. The tendons, he says, having no nerves distributed to them, are insensible. The ligaments and capsulæ of the articulations are also concluded to be insensible; whence Dr. Haller infers, that the sharp pains of the gout are not seated in the capsulæ of the joint, but in the skin, and in the nerves which creep upon its external surface. The bones are all insensible, says Dr. Haller, except the teeth; and likewise the marrow. Under his experiments the periosteum and pericranium, the dura and pia mater, appeared insensible; and he infers, that the sensibility of the nerves is owing to the medulla, and not to the membranes. The arteries and veins are held susceptible of little or no sensation, except the carotid, the lingual, temporal, pharyngeal, labial, thyroidal, and the aorta near the heart; the sensibility of which is ascribed to the nerves that accompany them. Sensibility is allowed to the internal membranes of the stomach, intestines, bladder, ureters, vagina, and womb, on account of their being of the same nature with the skin: the heart is also admitted to be sensible: but the lungs, liver, spleen, and kidneys, are possessed of a very imperfect, if any, sensation. The glands, having few nerves, are endowed with only an obtuse sensation. Some sensibility is allowed to the tunica choroides and

the iris, though in a less degree than the retina; but none to the cornea. Dr. Haller concludes, in general, that the nerves alone are sensible of themselves; and that, in proportion to the number of nerves apparently distributed to particular parts, such parts possess a greater or less degree of sensibility.

Irritability, he says, is so different from sensibility, that the most irritable parts are not at all sensible, and *vice versa*. He alleges facts to prove this position, and also to demonstrate, that irritability does not depend upon the nerves, which are not irritable, but upon the original formation of the parts which are susceptible of it. Irritability, he says, is not proportioned to sensibility; in proof of which, he observes that the intestines, though rather less sensible than the stomach, are more irritable; and that the heart is very irritable, though it has but a small degree of sensation.

Irritability, according to Dr. Haller, is the distinguishing characteristic between the muscular and cellular fibres; whence he determines the ligaments, periosteum, meninges of the brain, and all the membranes composed of the cellular substance, to be void of irritability. The tendons are unirritable; and though he does not absolutely deny irritability to the arteries, yet his experiments on the aorta produced no contraction. The veins and excretory ducts are in a small degree irritable, and the gall bladder, the ductus choledochus, the ureters and urethra, are only affected by a very acrid corrosive; but the lacteal vessels are considerably irritable. The glands and mucous sinuses, the uterus in quadrupeds, the human matrix, and the genitals, are all irritable; as are also the muscles, particularly the diaphragm. The œsophagus, stomach, and intestines, are irritable: but of all the animal organs the heart is endued with the greatest irritability. In general, there is nothing irritable in the animal body but the muscular fibres; and the vital parts are the most irritable. This power of motion, arising from irritations, is supposed to be different from all other properties of bodies, and probably resides in the glutinous mucus of the muscular fibres, altogether independent of the influence of the soul. The irritability of the muscles is said to be destroyed by drying of the fibres, congealing of the fat, and more especially by the use of opium in living animals. The physiological system, of which an abstract has been now given, has been adopted and confirmed by Cassell and Zimmermann, and also by Dr. Brocklesby, who suggests, that irritability, as distinguished from sensibility, may depend upon a series of nerves different from such as serve either for voluntary motion or sensation. This doctrine, however, has been controverted by M. le Cat, and particularly by Dr. Whytt in his *Physiological Essays*.

IRROGATIO, a law term amongst the Romans, signifying the instrument in which were put down the punishments which the law provided against such offences as any person was accused of by a magistrate before the people. These punishments were first proclaimed *viva voce* by the accuser, and this was called *Inquisitio*. The same, being immediately after expressed in writing, took the name of *Rogatio*, in respect of the people, who were to be consulted or asked about it; and was called *Irrogatio* in respect of the criminal, as it imported the mulct or punishment assigned him by the accuser.

IRROMANGO, or **ERRAMONGO**, one of the New Hebrides islands, is about 24 or 25 leagues in circuit; the middle of it lies in E. lon. 169. 19. S. lat. 18. 54. The inhabitants are of the middle size, and have a good shape and tolerable features. Their colour is very dark; and they paint their faces, some with black and others with red pigment: their hair is curly and crisp, and somewhat woolly. Few women were seen, and those very ugly: they wore a petticoat made of the leaves of some plant. The men were quite naked, excepting a belt tied about the waist, and a piece of cloth, or a leaf, used for a wrapper. No canoes were seen in any part of the island. They

live in houses covered with thatch; and their plantations are laid out by line, and fenced round. An unlucky scuffle between the British sailors and these people, in which four of the latter were desperately wounded, prevented captain Cook from being able to give any particular information concerning the produce, &c. of this island.

IRONAM, one of the Hebrides, in the S. Pacific Ocean, near Tanna. E. lon. 170. 26. S. lat. 19. 31.

IRTIŠ, a large river of Asia, in Siberia, which rises among the hills of the country of the Kalmucks, and, running north-east, falls into the Oby. It abounds with fish, particularly sturgeon, and delicate salmon.

IRTYSH, a large river in Asia, in Siberia, which running from the S. to N. E. falls into the Oby, near Tobolsk. The N. W. shore is low pasture-ground; on the other side are a prodigious number of black bears, wolves, and red and grey foxes, beside the best grey squirrels in all Siberia. This river abounds with fish.

IRVINE, a sea-port and parliament town of Scotland, in the bailiwick of Cunningham; seated at the mouth of a river of the same name on the frith of Clyde, in W. lon. 2. 55. N. lat. 55. 36. This port had formerly several buffes in the herring-fishery. At present that branch is given up; but the inhabitants still employ a number of brigs in the coal-trade to Ireland. Irvine had a viscount's title, now extinct.

IRVINE, or IRWIN, a river of Scotland, in Ayrshire, which, descending from the mountains on the E. passes by Derval, Newmills, Galston, and Riccarton, and falls into the frith of Clyde, close by the town of Irvine.

IRWELL, a river of Lancashire, which rises above Bolton, flows thence to Manchester, and falls into the Mersey below Flixton.

ISAAC, the Jewish patriarch, and example of filial obedience, died 1716 B. C. aged 180.

ISABELLA, FORT, a fortress of the Austrian Netherlands, seated on the W. side of the river Scheld, opposite Antwerp. E. lon. 4. 26. N. lat. 51. 13. There is another fort of the same name, two miles S. W. of Sluys, in Dutch Flanders.

ISABELLA, ST. an island of the S. Sea, and the largest of the Isles of Solomon. It was discovered by the Spaniards in 1568.

ISADAGAS, a town of Africa, in the kingdom of Morocco, and province of Escura. The inhabitants are good-natured and civil to strangers, for they will not let them pay any thing for their entertainment. It is seated in a country abounding in cattle; and the honey is very white, and in great esteem.

ISÆUS, a Greck orator, born at Colchis, in Syria, was the disciple of Lysias, and the master of Demosthenes; and taught eloquence at Athens, about 344 years B. C. Sixty-four orations are attributed to him; but he composed no more than 50, of which only 10 are now remaining. He took Lysias for his model, and so well imitated his style and elegance, that we might easily confound the one with the other, were it not for the figures which Isæus first introduced into frequent use. He was also the first who applied eloquence to politics, in which he was followed by his disciple Demosthenes. He ought not to be confounded with Isæus, another celebrated orator, who lived at Rome in the time of Pliny the younger, about the year 97.

ISAIAH, or *the Prophecy of ISAIAH*, a canonical book of the Old Testament. Isaiah is the first of the four greater prophets; the other three being Jeremiah, Ezekiel, and Daniel. This prophet was of royal blood, his father Amos being brother to Azariah king of Judah. The five first chapters of his prophecy relate to the reign of Uzziah; the vision in the sixth chapter happened in the time of Jotham: the next chapters, to the fifteenth, include his prophecies under the reign of Ahaz; and those that were made under the reigns of Hezekiah and

Manasseh, are related in the next chapters to the end. Isaiah foretold the deliverance of the Jews from their captivity in Babylon by Cyrus, one hundred years before it came to pass. But the most remarkable of his predictions are those concerning the Messiah, which describe not only his descent, but all the remarkable circumstances of his life and death. The style of this prophet is noble, nervous, sublime, and florid, which he acquired by converse with men of the greatest abilities and elocution: Grotius calls him the Demosthenes of the Hebrews. However, the profoundness of his thoughts, the loftiness of his expressions, and the extent of his prophecy, render him one of the most difficult of all the prophets; and the commentaries that have been hitherto written on his prophecy fall short of a full explication of it. Bishop Lowth's new translation, &c. published in 1778, throws considerable light on the composition and meaning of *Isaiah*.

ISATIS, WOAD; a genus of the siliquosa order, belonging to the tetradynamia class of plants; and in the natural method ranking under the 39th order, the *Siliquosa*. The siliqua is lanceolated, unilocular, monospermous, bivalved, and deciduous; the valves navicular or canoe-shaped. There are four species; but the only one worthy of notice is the tinctoria, or common woad, which is cultivated in several parts of Britain for the purposes of dyeing; being used as a foundation for many of the dark colours. See COLOUR-Making, DYEING, and WOAD.

The plant is biennial; the lower leaves are of an oblong oval figure, and pretty thick consistence, ending in obtuse roundish points; they are entire on their edges, and of a lucid green. The stalks rise four feet high, dividing into several branches, garnished with arrow-shaped leaves sitting close to the stalks; the branches are terminated by small yellow flowers, in very close clusters, which are composed of four small petals, placed in form of a cross, which are succeeded by pods shaped like a bird's tongue, which, when ripe, turn black, and open with two valves, having one cell, in which is situated a single seed.

This sort is sown upon fresh land which is in good heart, for which the cultivators of woad pay a large rent. They generally choose to have their lands situated near great towns, where there is plenty of dressing: but they never stay long on the same spot; for the best ground will not admit of being sown with woad more than twice; and if it is oftener repeated, the crop seldom pays the charges of culture, &c. Those who cultivate this commodity have gangs of people who have been bred to the employment; so that whole families travel about from place to place wherever their principal fixes on land for the purpose. As the goodness of woad consists in the size and fatness or thickness of the leaves, the only method to obtain this, is by sowing the seed upon ground at a proper season, and allowing the plants proper room to grow; as also to keep them clean from weeds, which, if permitted to grow, will rob the plants of their nourishment. After having made choice of a proper spot of land, which should not be too light and sandy, nor over stiff and moist, but rather a gentle hazel loam, whose parts will easily separate, the next is to plough this up just before winter, laying it in narrow high ridges, that the frost may penetrate through the ridges to mellow and soften the clods; then in the spring plough it again crosswise, laying it again in narrow ridges. After it has lain for some time in this manner, and the weeds begin to grow, it should be well harrowed to destroy them: this should be repeated twice while the weeds are young; and, if there are any roots of large perennial weeds, they must be harrowed out, and carried off the ground. In June the ground should be a third time ploughed, when the furrow should be narrow, and the ground stirred as deep as the plough will go, that the parts may be as well separated as possible; and when the weeds appear again, the ground should

be well harrowed to destroy them. Toward the end of July, or the beginning of August, it should be ploughed the last time, when the land should be laid smooth; and when there is a prospect of showers, the ground must be harrowed to receive the seeds, which should be sown in rows with the drill plough, or in broad-cast after the common method; but it will be proper to steep the seeds one night in water before they are sown, which will prepare them for vegetation: if the seeds are sown in drills, they will be covered with an instrument fixed to the plough for that purpose, but those which are sown broad cast in the common way must be well harrowed in. If the seeds are good, and the season favourable, the plants will appear in a fortnight, and in a month or five weeks will be fit to hoe; for the sooner this is performed when the plants are distinguishable, the better they will thrive, and the weeds being then young will be soon destroyed. The method of hoeing these plants is the same as for turnips; with this difference only, that these plants need not be thinned so much; for at the first hoeing, if they are separated to the distance of four inches, and at the last to six inches, it will be space enough for the growth of the plants; and if this is carefully performed, and in dry weather, most of the weeds will be destroyed: but as some of them may escape in this operation, and young weeds will rise, so the ground should be a second time hoed in the beginning of October, always choosing a dry time for this work: at this second operation, the plants should be singled out to the distance they are to remain. After this, if carefully performed, the ground will be clean from weeds till the spring, when young weeds will come up: therefore about the middle of March will be a good time to hoe the ground again; for, while the weeds are young, it may be performed in less than half the time it would require if the weeds were permitted to grow large, and the sun and wind will much sooner kill them: this hoeing will also stir the surface of the ground, and greatly promote the growth of the plants: if this is performed in dry weather, the ground will be clean till the first crop of woad is gathered, after which it must be again well cleaned: if this is carefully repeated after the gathering each crop, the land will always lie clean, and the plants will thrive the better. The expence of the first hoeing will be about six shillings *per* acre, and for the after-hoeings half that price will be sufficient, provided they are performed when the weeds are young; for, if they are suffered to grow large, it will require more labour, nor can it be so well performed.

If the land, in which this seed is sown, should have been in culture before for other crops, so not in good heart, it will require dressing before it is sown; in which case rotten stable-dung is preferable to any other: but this should not be laid on till the last ploughing, just before the seeds are sown, and not spread till the land is ploughed, that the sun may not exhale the goodness of it, which in summer is soon lost when spread on the ground. The quantity should not be less than 20 loads to each acre, which will keep the ground in heart till the crop of woad is spent.

The time for gathering of the crop is according to the season: but it should be performed as soon as the leaves are fully grown, while they are perfectly green: for, when they begin to change pale, great part of their goodness is over; for the quantity will be less, and the quality greatly diminished.

If the land is good, and the crop well husbanded, it will produce three or four gatherings; but the two first are the best. These are commonly mixed together in the manufacturing of it: but the after-crops are always kept separate; for, if these are mixed with the other, the whole will be of little value. The two first crops will sell from 25 l. to 30 l. a ton; but the latter will not bring more than 7 l. or 8 l. and sometimes not so much. An acre of land will produce a ton of woad, and in good seasons near a ton and an half.

When the planters intend to save the seeds, they cut three crops of the leaves, and then let the plants stand till the next year for seed; but if only one crop is cut, and that only of the outer leaves, letting all the middle leaves stand to nourish the stalks, the plants will grow stronger, and produce a much greater quantity of seeds.

These seeds are often kept two years, but it is always best to sow new seeds when they can be obtained. The seeds ripen in August; and when the pods turn to a dark colour, the seeds should be gathered. It is best done by reaping the stalks in the same manner as wheat, spreading the stalks in rows upon the ground: and in four or five days the seeds will be fit to thrash out, provided the weather is dry; for, if it lies long, the pods will open and let out the seeds.

There are some of the woad-planters who feed down the leaves in winter with sheep; which is a very bad method: for all plants which are to remain for a future crop should never be eaten by cattle, for that greatly weakens the plants; therefore those who eat down their wheat in winter with sheep are equally blameable.

ISATIS, in zoology, a synonyme of the *canis lagopus*. See *CANIS*.

ISAURA, or ISAVRUS, in ancient geography, a strong city at mount Taurus, in Isauria, twice demolished; first by Perdiccas, or rather by the inhabitants, who, through despair, destroyed themselves by fire, rather than fall into the hands of the enemy; again by Servilius, who thence took the surname *Lauricus*. Strabo says there were two Isauras, the old and the new, but so near that other writers took them but for one.

ISAURIA, a country touching Pamphylia and Cilicia on the north, rugged and mountainous, situated almost in mount Taurus, and taking its name from Isaura; according to some, extending to the Mediterranean by a narrow slip. Stephanus, Ptolemy, and Zosimus, make no mention of places on the sea; though Pliny does, as also Strabo; but doubtful, whether they are places in Isauria Proper, or in Pamphylia, or in Cilicia.

ISAURICA, a part of Lycaonia, bordering on mount Taurus.

ISCA DUMNIORUM, in ancient geography; a town in Britain. Now Exeter, capital of Devonshire. Called *Cacr-lyk* in British. (Camden.)

ISCA SILURUM, in ancient geography the station of the Legio II. Augusta, in Britain. Now *Carlton*, a town of Monmouthshire, on the Uike.

ISCHALIS, or ISCALIS, in ancient geography; a town of the Belgæ in Britain. Now *Ilchester* in Somersetshire, on the river Ill.

ISCHÆMUM, in botany; a genus of the monœcia order, belonging to the polygamia class of plants; and in the natural method ranking under the 4th order, *Gramina*. The calyx of the hermaphrodite is a biflorous glume; the corolla bivalved; there are three stamina, two styles, and one seed. The calyx and corolla of the male, as in the former, with three stamina.

ISCHIUM, in anatomy, one of the bones of the pelvis. See *ANATOMY*, p. 166.

ISCHIA, an island of Italy, in the kingdom of Naples, about 15 miles in circumference, lying on the coast of the Terra di Lavoro, from which it is three miles distant. It is full of agreeable valleys, which produce excellent fruits. It hath also mountains on which grow vines of an excellent kind: likewise fountains, rivulets, and fine gardens.

ISCHIA, a town of Italy, and capital of an island of the same name, with a bishop's see and a strong fort. Both the city and fortrefs stand upon a rock, which is joined to the island by a strong bridge: the rock is about seven furlongs in circumference. The city is like a pyramid of houses piled upon one another, which makes a very singular and striking appearance. At the

end of the bridge next the city are iron gates, which open into a subterraneous passage, through which they enter the city. They are always guarded by soldiers who are natives of the island. E. lon. 13. 55. N. lat. 40. 50.

ISCHURIA, *ισχυρία*, formed from *ισχω* "I stop," and *ουρα* "urine," in phylis, a disease consisting in an entire suppression of urine. See **SURGERY**. It is occasioned by any thing which may obstruct the urinary passages, as sand, stone, mucus, &c. It may also arise from a loss of power in the nerves which pass to the kidneys or bladder, as we see it does in a palsy of the parts below the diaphragm. The too great distension of the bladder may also produce the same effect; for it sometimes happens, that persons who have retained their urine a long time find a great deal of difficulty in discharging it.

ISELASTICS, a kind of games, or combats, celebrated in Greece, and Asia, in the time of the Roman emperors. The victor at these games had very considerable privileges conferred on him, after the example of Augustus and the Athenians, who did the like to conquerors at the Olympic, Pythian, and Isthmian games. They were crowned on the spot immediately after their victory, had pensions allowed them, were furnished with provisions at the public cost, and were carried in triumph to their country.

ISELSTEIN, a small town of the United Provinces, seated on the river Issel, four miles from Utrecht.

ISENACH, a town of Germany, in the circle of Upper Saxony, from whence one of the Saxon princes takes the title of *duke*. There are iron mines in the neighbourhood. E. lon. 9. 17. N. lat. 51. 0.

ISENBURG, a large town of Germany, capital of a county of the same name, with a handsome castle, seated on the river Seine, in E. lon. 7. 14. N. lat. 50. 28. The county belongs to the elector of Treves.

ISENGHEIN, a town of the Austrian Netherlands, with the title of a *principality*, seated on the river Mandera, in E. lon. 3. 18. N. lat. 50. 44.

ISER, a considerable river of Germany, which rises on the confines of Tirol and Bavaria, and, having passed by Munich and Landshut, falls into the Danube between Straubing and Passau.

ISERE, a department of France, which includes part of the late province of Dauphiny. It is so named from a river which rises on the confines of Savoy, and falls into the Rhone, above Valence. Grenoble is the episcopal city of this department.

ISENARTS, or **EISENARTS**, a considerable town of Germany, in Stiria; famous for its iron mines, 30 miles N. W. of Gratz. E. lon. 15. 4. N. lat. 47. 25.

ISERNIA, a town of Italy, in the kingdom of Naples, and in the county of Molise, with a bishop's see. It is seated at the foot of the Appenines, in E. lon. 14. 20.

ISIA, *Ισηια*, feasts and sacrifices anciently solemnized in honour of the goddess Isis. The Isia were full of the most abominable impurities; and for that reason, those who were initiated into them were obliged to take an oath of secrecy. They were held for nine days successively, but grew so scandalous, that the senate abolished them at Rome under the consulate of Piso and Gabinius. They were re-established by Augustus; and the emperor Commodus himself assisted at them, appearing among the priests of that goddess with his head shaven, and carrying the Anubis.

ISIAC TABLE is one of the most considerable monuments of antiquity, discovered at Rome in 1525, and supposed by the various figures in bas-relief upon it to represent the feasts of Isis, and other Egyptian deities. There have been various opinions as to the antiquity of this monument: some have supposed that it was engraved long before the time when the Egyptians worshipped the figures of men and women. Others, among

whom is bishop Warburton, apprehend, that it was made at Rome by persons attached to the worship of Isis. Dr. Warburton considers it as one of the most modern of the Egyptian monuments, on account of the great mixture of hieroglyphic characters which it bears.

ISIACI, priests of the goddess Isis. Dioecorides tells us, that they bore a branch of sea-wormwood in their hands instead of olive. They sung the praises of the goddess twice a-day, viz. at the rising of the sun, when they opened her temple; after which they begged alms the rest of the day, and, returning at night, repeated their orisons, and shut up the temple. Such was the life and office of the *Isiaci*: they never covered their feet with any thing but the thin bark of the plant papyrus, which occasioned Prudentius and others to say they went bare-footed. They wore no garments but linen, because Isis was the first who taught mankind the culture of this commodity.

ISIDORUS, called **DAMIATENSIS**, or **PELUSIOTA**, from his living in a solitude near that city, was one of the most famous of all St. Chrysostom's disciples, and flourished in the time of the general council held in 421. We have 2012 of his epistles in five books. They are short, but well written, in Greek. The best edition is that of Paris, in Greek and Latin, printed in 1638, in folio.

ISIGNI, a town of France, in the department of Calvados and late province of Normandy, with a small harbour. It is 15 miles W. of Bayeux, and well known on account of its salt-works, its cider, and its butter. W. lon. 0. 59. N. lat. 49. 20.

ISINGLASS. See **ICHTHYOCOLLA**.

ISIS, a celebrated deity of the Egyptians, daughter of Saturn and Rhea, according to Diodorus of Sicily. Some suppose her to be the same as Io, who was changed into a cow, and restored to her human form in Egypt, where she taught agriculture, and governed the people with mildness and equity; for which reasons she received divine honours after death. According to some traditions mentioned by Plutarch, Isis married her brother Osiris, and was pregnant by him even before she had left her mother's womb. These two ancient deities, as some authors observe, comprehended all nature and all the gods of the heathens. Isis was the Venus of Cyprus, the Minerva of Athens, the Cybele of the Phrygians, the Ceres of Eleusis, the Proserpine of Sicily, the Diana of Crete, the Bellona of the Romans, &c. Osiris and Isis reigned conjointly in Egypt; but the rebellion of Typhon, the brother of Osiris, proved fatal to this sovereign. The ox and the cow were the symbols of Osiris and Isis; because these deities, while on earth, had diligently applied themselves in cultivating the earth. As Isis was supposed to be the moon, as Osiris the sun, she was represented as holding a globe in her hand, with a vessel full of ears of corn. The Egyptians believed that the yearly and regular inundations of the Nile proceeded from the abundant tears which Isis shed for the loss of Osiris, whom Typhon had basely murdered. The word *Isis*, according to some, signifies "ancient," and on that account the inscriptions on the statues of the goddess were often in these words: "I am all that has been, that shall be, and none among mortals has hitherto taken off my veil." The worship of Isis was universal in Egypt; the priests were obliged to observe perpetual chastity, their head was closely shaved, and they always walked barefooted, and clothed themselves in linen garments. They never ate onions, they abstained from salt with their meat, and were forbidden to eat the flesh of sheep and of hogs. During the night they were employed in continual devotion near the statue of the goddess. Cleopatra, the beautiful queen of Egypt, was wont to dress herself like this goddess, and affected to be called a second Isis.

ISIS, or *Thames*, a river that has its rise in Gloucestershire, and flows through only a small part of Wiltshire. It enters

this county near its source, and begins to be navigable for boats at Cricklade; but after running in a serpentine manner about four miles, it leaves Gloucestershire at a village called *Castle Eaton*.

ISLAM; the true faith, according to the Mahometans. See MAHOMETANISM.

ISLAND, a tract of dry land encompassed with water; in which sense it stands contradistinguished from CONTINENT, or TERRA FIRMA. Several naturalists are of opinion, that the islands were formed at the deluge; others think, that there have been new islands formed by the casting up of vast heaps of clay, mud, sand, &c.; others think that they have been separated from the continent by violent storms, inundations, and earthquakes. These last have observed, that the East Indies, which abound in islands more than any other part of the world, are likewise more annoyed with earthquakes, tempests, lightnings, volcanoes, &c. than any other part. Others again conclude, that islands are as ancient as the world, and that there were some at the beginning; and, among other arguments, support their opinion from Gen. x. 5. and other passages of Scripture.

Varenus thinks that there have been islands produced each of these ways. St. Helena, Ascension, and other steep rocky islands, he supposes to have become so by the sea's overflowing their neighbouring champaigns: but by the heaping up huge quantities of sand, and other terrestrial matter, he thinks the islands of Zealand, Japan, &c. were formed. Sumatra and Ceylon, and most of the East India islands, he thinks, were rent off from the main land; and concludes, that the islands of the Archipelago were formed in the same way, imagining it probable that Deucalion's flood might contribute towards it. The ancients had a notion that Delos, and a few other islands, rose from the bottom of the sea; which, how fabulous soever it may appear, agrees with later observations. Seneca takes notice, that the island Therasia rose thus out of the Ægean sea in his time, of which the mariners were eye-witnesses.

It is indeed very probable, that many islands have existed not only from the deluge, but from the creation of the world; and we have undoubted proofs of the formation of islands in all the different ways above mentioned. Another way, however, in which islands are frequently formed in the South Sea, is by the coralline insects. On this subject the following curious dissertation by Alexander Dalrymple, Esq. appeared in the Philosophical Transactions for 1767.

"These islands are generally long and narrow: they are formed by a narrow bar of land, inclosing the sea within it; generally, perhaps always, with some ingress at least to the tide; commonly with an opening capable of receiving a canoe, and frequently sufficient to admit even larger vessels.

"The origin of these islands will explain their nature. What led me first to this deduction was an observation of Abdul Roobin, a Sooloo pilot, that all the islands lying off the north-east coast of Borneo had shoals to the eastward of them.

"These islands being covered to the westward by Borneo, the winds from that quarter do not attack them with violence. But the north-east winds, tumbling in the billows from a wide ocean, heap up the coral with which those seas are filled. This, obvious after storms, is perhaps at all other times imperceptibly effected.

"The coral banks, raised in the same manner, become dry. These banks are found of all depths, at all distances from shore, entirely unconnected with the land, and detached from each other; although it often happens that they are divided by a narrow gut without bottom.

"Coral banks also grow, by a quick progression, towards

the surface; but the winds, heaping up the coral from deeper water, chiefly accelerate the formation of these into shoals and islands. They become gradually shallower; and, when once the sea meets with resistance, the coral is quickly thrown up by the force of the waves breaking against the bank; and hence it is, that, in the open sea, there is scarce an instance of a coral-bank having so little water that a large ship cannot pass over, but it is also so shallow that a boat would ground on it.

"I have seen these coral banks in all the stages; some in deep water, others with few rocks appearing above the surface; some just formed into islands, without the least appearance of vegetation; and others from such as have a few weeds on the highest part, to those which are covered with large timber, with a bottomless sea at a pistol-shot distance.

"The loose coral, rolled inward by the billows in large pieces, will ground; and the reflux being unable to carry them away, they become a bar to coagulate the sand, always found intermixed with coral; which sand, being easiest raised, will be lodged at the top. When the sand-bank is raised by violent storms beyond the reach of common waves, it becomes a resting-place to vagrant birds, whom the search of prey draws thither. The dung, feathers, &c. increase the soil, and prepare it for the reception of accidental roots, branches and seed, cast up by the waves, or brought thither by birds. Thus islands are formed: the leaves and rotten branches, intermixing with the sand, form in time a light black mould, of which in general these islands consist; more sandy as less woody; and, when full of large trees, with a greater proportion of mould.

"Cocoa-nuts, continuing long in the sea without losing their vegetative powers, are commonly to be found in such islands; particularly as they are adapted to all soils, whether sandy, rich, or rocky.

"The violence of the waves within the tropics must generally be directed to two points, according to the monsoons.

"Hence the islands formed from coral-banks must be long and narrow, and lie nearly in a meridional direction. For, even supposing the banks to be round, as they seldom are when large, the sea meeting most resistance in the middle, must heave up the matter in greater quantities there than towards the extremities: and, by the same rule, the ends will generally be open, or at least lowest. They will also commonly have soundings there, as the remains of the bank, not accumulated, will be under water.

"Where the coral-banks are not exposed to the common monsoon, they will alter their direction; and be either round, extending the parallel, or be of irregular forms, according to accidental circumstances.

"The interior parts of these islands being sea, sometimes form harbours capable of receiving vessels of some burthen, and, I believe, always abound greatly with fish; and, such as I have seen, with turtle-grass and other sea-plants, particularly one species, called by the Sooloos *gammye*, which grows in little globules, and is somewhat pungent, as well as acid, to the taste.

"It need not be repeated, that the ends of those islands only are the places to expect soundings; and they commonly have a shallow spit running out from each point.

"Abdul Roobin's observation points out another circumstance, which may be useful to navigators; By consideration of the winds to which any islands are most exposed, to form a probable conjecture which side has deepest water; and from a view which side has the shoals, an idea may be formed which winds rage with most violence."

Islands from their situation enjoy many great advantages, the principal of which are these. In the first place, many benefits are derived to the inhabitants of an island from its unity. The very largest country on a continent is still but a

part, which implies dependence, and is necessarily attended with a train of imperfections; from all of which, by the unerring and unalterable laws of nature, the people who live in an island are or may be entirely free. All countries on the continent are exposed to continual dangers, against which their inhabitants must be perpetually upon their guard. This renders a large military force requisite. It involves them in continual negotiations, leagues, and alliances; all of which, however, cannot exempt them from frequent wars, or the miseries that attend them, and which have commonly bad effects on their internal policy. In the next place, the climate is generally mild and salubrious from the vapours of the surrounding sea, which according to the latitude abates the violence of heat, and moderates the rigour of cold, both which are sensibly and constantly less than on continents under the same elevation of the pole. We have a remarkable instance of this in the islands called anciently *Stœvades*, in the modern Latin *Insule Arcarum*, by us the islands of *Hieræ*. They are three in number, lying in 43° north latitude, before the port of Toulon. In them the fruits of France and Italy arrive at the highest perfection, and all the medical herbs of Italy, Greece, and Egypt, grow wild. Yet the climate is wonderfully temperate and pleasant in all seasons. There is also commonly a greater variety, and always a greater fertility, in the soil, occasioned chiefly by the warmth of the circumambient air, frequent showers, and, in consequence of both, being continually impregnated with vegetable salts. Another considerable advantage arises from its accessibility on every side, by which it is open to receive supplies from other countries, and has the conveniency of exporting its commodities and manufactures to all markets, and, in comparison of the continent, at all seasons. The opposite sides of an island may in regard to commerce be considered as two countries; each has its ports, its proper commodities, its proper correspondencies; in consequence of which, it promotes the cultivation, and procures vent for the manufactures, of a large district behind it; while the intermediate midland space finds a profit in that inland trade, which these two districts supply. The winds contrary on one side are favourable on the other; and the sea, the common road to both coasts, is continually ploughed by vessels outward and homeward bound, which keeps up that active and enterprising spirit which characterizes islanders. An island has at once the most extensive and the most effectual frontier, and this on all sides, subsisting for ever, without repairs, and without expence; and, which is still more, derives from this very frontier a great part of the subsistence of its inhabitants, and a valuable article in its commerce, from its fisheries. It is commonly said the sea is a mine, but in truth it is better; its treasures are more lasting and more certain, procured by labour solely, and fit for use or for sale as soon as procured, quickly consumed, and thereby the source of continual employment to a stout, hardy, laborious race of men, who likewise find employment for numbers, and are in various respects otherwise beneficial members of the community. The defence of this natural barrier, which, as we have said, costs nothing, but on the contrary yields much, is not only permanent, but in every respect more to be relied on than any that could be raised by the skill and industry of men at the greatest expence. All these blessings and benefits are insured by the lesson that nature dictates, some would say the law which she prescribes, to the inhabitants of every island, to place all their hopes in the assiduous cultivation of their own country, to bend all their endeavours to raising and extending their commerce, and to put their trust in Providence, and in the safeguard which she directs; men accustomed to robust and hardy exercises, and in what necessarily arises from their way of life, a naval force. The first inhabitants come

in vessels, are for a time dependent on the country from whence they came, arrive at independence by enlarging their correspondence: and thus commerce is natural and essential to the people of an island; which is the reason that they thrive so long as they possess it, and gradually decline in the same proportion in which that decays.

ISLANDS of Ice. See ICE-Island.

Floating-ISLANDS. Histories are full of accounts of floating islands; but the greater part of them are either false or exaggerated. What we generally see of this kind is no more than the concretion of the lighter and more viscous matter floating on the surface of the water in cakes; and, with the roots of the plants, forming congeries of different sizes, which, not being fixed to the shore in any part, are blown about by the winds, and float on the surface. These are generally found in lakes, where they are confined from being carried too far; and, in process of time, some of them acquire a very considerable size. Seneca tells us of many of these floating islands in Italy; and some later writers have described not a few of them in other places. But, however true these accounts might have been at the time when they were written, very few proofs of their authenticity are now to be found; the floating islands having either disappeared again, or been fixed to the sides in such a manner as to make a part of the shore. Pliny tells us of a great island which at one time swam about in the lake Cutilia in the country of Reatinum, which was discovered to the old Romans by a miracle; and Pomponius tells us, that in Lydia there were several islands so loose in their foundations, that every little accident shook and removed them.

Bay of ISLANDS, a bay of New Zealand, at the N. extremity of the most northern of the two islands that go under that name. In 1772, M. Dufresne Marion, with two French sloops under his command, put into this bay in great distress, and, with 28 of his crew, was surprised and murdered by the natives.

ISLAND (or Iceland) Crystal. See ISLAND-CRYSTAL.

ISLAY, or ILA, an island of Scotland, one of the Hebrides, to the S. W. of Jura. Its greatest length is 25 miles; its breadth 18. The principal village is Bowmore, which is in a manner a new town, and has a convenient harbour. The face of the country is hilly. Several mines are wrought to great advantage; and the lead-ore is very rich and productive. Here likewise are copper, emery, native quicksilver, and black lead; with immense stores of limestone, marl, coral, and shell-sand, for manure. Much corn and flax is raised here, and a great number of cattle exported. In this, and some of the neighbouring islands, multitudes of adders infest the heath. On the N. W. side of the island is the cave of Sanegmore, which is a grotto, divided into a number of far-winding passages, sometimes opening into fine expanses; again closing, for a long space, into galleries, and forming a curious subterraneous labyrinth. There are also many other caverns, the haunts of numerous wild pigeons, that lodge and breed in them. The goats that feed among the rocks are so wild, that they are obliged to be shot like deer. Some vestiges of antiquity are on this island; particularly, the remains of a circular dry stone building, on the hill of Lofset, near the sound of Ilay. This hill contains fine iron ore and emery.

ISLE-ADAM, a town of France, in the department of Seine and Oise and late province of the Isle of France, with a handsome castle, seated on the river Oise, three miles from Beaumont, and 20 from Paris. E. lon. 2. 13. N. lat. 49. 7.

ISLE of Bees, an island of N. America, in the gulf of Mexico, and bay of Campeachy, about 17 miles in length, and eight in breadth. It is fertile in several places, and abounds in cattle and excellent fruits.

ISLE-de-Dieu, a small island of France, 14 miles from the coast of Poitou. W. lon. 2. 15. N. lat. 46. 45.

ISLE-de-France. See FRANCE, *Ile of*.

ISLE-Jourdain, a town of France, in the department of Gers, and late province of Armagnac, in an island of the little river Save, eight miles N. of Lombes. E. lon. 1. 2. N. lat. 43. 40.

ISLE-Rouffe, a town of Corsica, on the sea-coast, 36 miles S. W. of Bastia.

ISLE and Vilaine, a department of France, containing part of the late province of Bretagne. Rennes is the capital.

ISLEBIANS, in ecclesiastical history, a name given to those who adopted the sentiments of a Lutheran divine of Saxony, called John Agricola, a disciple and companion of Luther, a native of Isleb, whence the name; who, interpreting literally some of the precepts of St. Paul with regard to the Jewish law, declaimed against the law and the necessity of good works. See **ANTINOMIANS**.

ISLEWORTH, a large village in Middlesex, 9 miles W. of London, seated on the river Thames. In this parish is Sion House, the magnificent seat of the duke of Northumberland, and several handsome villas. The S. side of Hounslow is also in this parish. W. lon. 0. 14. N. lat. 51. 29.

ISLINGTON, a village of Middlesex, on the north side of London, to which it is almost contiguous. It appears to be of Saxon origin; and in the Conqueror's time was written *Isledon*, or *Isendon*. The church is one of the prebends of St. Paul's; to the dean and chapter of which a certain precinct here belongs, for the probate of wills, and granting administrations. The church was a Gothic structure, erected in 1503, and stood till 1751, when the inhabitants applied to parliament for leave to rebuild it, and soon after erected the present structure, which is a very substantial brick edifice, though it does not want an air of lightness. Its houses are above 4000, including the Upper and Lower Holloways, three sides of Newington-Green, and part of Kingsland, on the road to Ware. The White Conduit-house in this place, so called from a white stone conduit that stands before the entrance, has handsome gardens with good walks, and two large rooms one above the other for the entertainment of company at tea, &c. In the S. W. part of this village is that noble reservoir, improperly called New-River Head; though they are only two basons, which receive that river from Hertfordshire, and from whence the water is thrown by an engine into the company's pipes for the supply of London. In the red-moat on the north side of these basons, called Six-Acre-Field from the contents of it, which is the third field beyond the White-Conduit, there appears to have been a fortress in former days, inclosed with a rampart and ditch, which is supposed to have been a Roman camp made use of by Suetonius Paulinus after his retreat, which Tacitus mentions, from London, before he sallied thence, and routed the Britons under their queen Boadicea; and that which is vulgarly, but erroneously, called Jack Straw's castle, in a square place in the S. W. angle of the field, is supposed to have been the seat of the Roman general's pretorium or tent. In this parish are two charity-schools; one founded in 1613 by Dame Alice Owen, for educating 30 children. This foundation, together with that of a row of alms-houses, are under the care of the brewers' company. Here is an hospital with its chapel, and a work-house for the poor. There is a spring of chalybeate water, in a very pleasant garden, which for some years was honoured by the constant attendance of the princess Amelia, and many persons of quality, who drank the waters. To this place, which is called New Tunbridge Wells, many people resort, particularly during the summer, the price of drinking the waters being 10s. 6d. for the season. Near this place is a house

of entertainment called Sadler's Wells, where, during the summer season, people are amused with balance-masters, walking on the wire, rope-dancing, tumbling, and pantomime entertainments.

ISLIP, a town of Oxfordshire, 56 miles from London, is noted for the birth and baptism of Edward the Confessor. By the late inland navigation, it has communication with the rivers Mersey, Dee, Ribble, Ouse, Trent, Darwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Cheshire, Stafford, Warwick, Leicester, Oxford, Worcester, &c. It has a good market for sheep, and some remains of an ancient palace, said to have been king Ethelred's. Here is a charity-school. The chapel wherein Edward was baptized stood at a small distance north from the church, and is still called the king's chapel. It was entirely defaced during Cromwell's usurpation, and converted to the meanest uses of a farm-yard; at present it has a roof of thatch. It is built of stone 15 yards long and 7 broad, and retains traces of the arches of an oblong window at the east end. This manor was given by Edward the Confessor to Westminster abbey, to which it still belongs.

ISMAELITES, the descendants of Ismael; dwelling from Havila to the wilderness of Sur, towards Egypt, and thus overspreading Arabia Petraea; and therefore Josephus calls Ismael the founder of the Arabs.

ISMAIL, a strong town of Turkey in Europe, in Bessarabia. It was taken by storm, by the Russians, on the 22d of December 1790; and it is said, that the long siege, and the capture, did not cost them less than 10,000 men. The most shocking part of the transaction is, that the garrison (whose bravery merited, and would have received from a generous foe, the highest honours) were massacred in cold blood by the merciless Russians, to the amount, by their own account, of 30,000 men: and the place was abandoned to the fury of the brutal soldiery. Ismail is seated on the N. side of the Danube, 140 miles S. by W. of Bender. E. lon. 29. 30. N. lat. 45. 11.

ISMARUS, in ancient geography, a town of the Cicones in Thrace, giving name to a lake. In Virgil it is called Ismara. Servius supposes it to be a mountain of Thrace; on which mountain Orpheus dwelt.

ISNARDIA, in botany; a genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. There is no corolla; the calyx is quadrifid; the capsule quadrilocular, and girt with the calyx.

ISNIC, a town of Turkey in Asia, and in Natolia, with a Greek archbishop's see. It is the ancient Nice, famous for the first general council held here in 325. There is now nothing remaining of its ancient splendour but an aqueduct. The Jews inhabit the greatest part of it; and it is seated in a country fertile in corn and excellent wine. E. lon. 30. 9. N. lat. 47. 15.

ISNY, an imperial town of Germany, in Swabia, and in Algow; seated on the river Isny, in E. lon. 9. 10. N. lat. 47. 33.

ISOCHRONAL is applied to such vibrations of a pendulum as are performed in the same space of time; as all the vibrations or swings of the same pendulum are, whether the arches it describes are shorter or longer.

ISOCHRONAL-Line, that in which a heavy body is supposed to descend without any acceleration.

ISOCRATES, one of the greatest orators of Greece, was born at Athens 436 B. C. He was the son of Theodorus, who had enriched himself by making musical instruments, and gave his son a liberal education. Isocrates was the disciple of Prodicus, Gorgias, and other great orators. He endeavoured

at first to declaim in public, but without success; he therefore contented himself with instructing his scholars, and making private orations. He always showed great love for his country; and being informed of the loss of the battle of Cheronæa, he abstained four days from eating, and died, aged 98. There are still extant 21 of his discourses or orations, which are excellent performances, and have been translated from the Greek into Latin by Wolfius. Isocrates particularly excelled in the justness of his thoughts, and the elegance of his expressions. There are also nine letters attributed to him.

ISOETES, in botany; a genus of the natural order of filices, belonging to the cryptogamia class of plants. The anthers of the male flower are within the base of the frons or leaf. The capsule of the female flower is bilocular, and within the base of the leaf.

ISOLA, a town of Italy, in the kingdom of Naples, and in the Farther Calabria, with a bishop's see. It is a sea-port town, and is seated 15 miles south-east of St. Severina. E. lon. 7. 33. N. lat. 39. 1.

ISOPERIMETRICAL FIGURES, in geometry, are such as have equal perimeters or circumferences.

ISOPYRUM, in botany; a genus of the polygynia order, belonging to the polyandria class of plants; and in the natural method ranking under the 26th order, *Multifiliqueæ*. There is no calyx, but five petals; the nectaria trifid and tubular; the capsules recurved and polyspermous.

ISOSCELES TRIANGLE, in geometry, one that has two equal sides.

ISPAHAN, or, as the Persians pronounce it, *Spauhawn*, the capital of Persia, is situated in the province of Irac, Agemi, or Persia Proper, upon the ruins, as generally supposed, of the ancient Hecatompylos, or, as others think, of the Aspa of Ptolemy. Most of the eastern astronomers and geographers place it in N. lat. 32. 25. E. lon. 86. 40. It stands in a very extensive plain, surrounded by mountains; and has eight districts belonging to it, that contain about 400 towns and villages. The fertility of the soil, the mildness of the seasons, and the fine temperature of the air, all conspire to render Ispahan one of the most charming and delightful cities in the world. It is unanimously agreed, that the present city is of no great antiquity; and the two parts into which it is divided preserve the names of two contiguous towns, from the junction of which it was formed. The inhabitants of these, notwithstanding their neighbourhood, bear an inveterate antipathy to each other; which they discover on all public occasions. Spauhawn owes the glory it now possesses to the great Shah Abas; who, after the conquest of the kingdoms of Lar and Ormus, charmed with the situation of this place, made it the capital of his empire, between the years 1620 and 1628. The mountains, with which this city is surrounded, defend it alike from the sultry heats of summer and the piercing winds of the winter season; and the plain on which it stands is watered by several rivers, which contribute alike to its ornament and use. Of these rivers, the Zenderoud, after being joined by the Mahmood, passes by Spauhawn; where it has three fine bridges over it, and is as broad as the Seine at Paris. The waters of these united streams are sweet, pleasant, and wholesome, almost beyond comparison; as, indeed, are all the springs found in the gardens belonging to the houses of Spauhawn. The extent of Spauhawn is very great; not less, perhaps, than 20 miles within the walls, which are of earth, poorly built, and so covered with houses, and shaded with gardens, that in many places it is difficult to discover them. The Persians are wont to say, *Spauhawn nisfigibon*, i. e. Spauhawn is half the world. Sir John Chardin says, that, though some reckoned 11,000,000 inhabitants in it, he did not himself look upon it as more populous than London. At a distance, the city is not easily dis-

tinguished; for many of the streets being adorned with plantains, and every house having its garden, the whole looks like a wood. The streets in general are neither broad nor convenient; there being three great evils which attend them: the first is, that being built on common sewers, these are frequently broke up, which is very dangerous, considering that most people are on horseback; the second is, that there are many wells or pits in them, which are not less dangerous; the third arises from the people's emptying all their ordure from the tops of their houses: this last, indeed, is in some measure qualified by the dryness of the air, and by its being quickly removed by the peasants, who carry it away to dung their grounds. Some reckon eight, and others ten gates, besides posterns; but all agree that there is no difficulty of entering at any hour of the day or night. The three principal suburbs annexed to it are, Abas-Abad, built by Shah Abas, and belonging to the people of Tauris; Julfa, inhabited by a colony of Armenians, called by some *New Julfa*, to distinguish it from the ancient city of that name, situated in Armenia, upon the Araxes, whence the original inhabitants of New Julfa were brought; and Ghebr-Abad, or, as the Arabs pronounce it, Kebr Abad, the street of the magians, occupied entirely by the professors of magism, or the religion of the ancient Persians. The river Zenderoud separates the city of Ispahan and Abas-Abad from Julfa and Ghebr-Abad. This city has suffered greatly since the commencement of the dreadful rebellion in 1721; the whole kingdom from that period, till a few years ago, having been almost a continued scene of blood, ravages, and confusion. A celebrated modern traveller, who was on the spot, tells us, that the inhabitants of Julfa, not many years before the above revolution happened, amounted to 30,000 souls; had 13 churches, and above 100 priests; and paid the Persian court 200 tomans yearly for the free exercise of their religion: that some of the streets were broad and handsome, and planted with trees, with canals and fountains in the middle; others narrow and crooked, and arched a-top; others again, though extremely narrow, as well as turning and winding many ways, were of an incredible length, and resembled so many labyrinths: that, at a small distance from the town, there were public walks adorned with plane-trees on either hand, ways paved with stones, fountains, and cisterns: that there were above 100 caravanferas for the use of merchants and travellers, many of which were built by the kings and princely nobility of Persia: that, as little rain fell there, the streets were frequently full of dust, which rendered the city disagreeable during a considerable part of the summer; that the citizens, however, to make this inconvenience more tolerable, used to water them when the weather was warmer than usual: that there was a castle in the eastern part of the town, which the citizens looked upon as impregnable, in which the public money, and most of the military stores, were said to be kept: that, notwithstanding the baths and caravanferas were almost innumerable, there was not one public hospital: that most of the public buildings were rather neat than magnificent, though the great meydan or market place, the royal palace (which is three quarters of a league in circumference), and the alley denominated *Toker-lag* adjoining to it, made a very grand appearance: that the former contained the royal mosque; the building denominated *kayserieh*, where all sorts of foreign commodities were exposed to sale; and the mint, styled by the Persians *ferraa kloneb*, where the current money of the kingdom was coined: that, besides the native Persians, there were then in Ispahan above 10,000 Indians all supported by trade; 20,000 Georgians, Circassians, and Tartars of Daghestan or Leisgees, with a considerable number of English, Dutch, Portuguese, and a few French; that the Capuchins, discalceated or bare-footed Carmelites, Jesuits Dominicans, and Austin-friars, had likewise their convents

here, though they were unable to make any converts; and that there were above 100 mosques and public colleges. But since the fatal period above mentioned, the suburb of Julfa was almost totally abandoned by the Armenians. The government of Ispahan, 23 leagues long and as many broad, comprehending several districts, most of them formerly well peopled, appeared not many years ago little better than a desert; most of the inhabitants of that fertile and delightful tract being fled and dispersed. Multitudes of them had taken a precarious refuge in the mountains of Loristan, lying between Ispahan and Sufter; their lands were left untilld, and their houses mouldered into ruins. In short, all the distresses of an unsuccessful war, or the invasion of a barbarous enemy, could not have plunged the people of Ispahan into greater misery than the victories of their tyrannical king Nadir Shah, who seemed more solicitous to humble his own subjects than his enemies.

ISPIDA, in ornithology. See ALCEDO.

ISRAEL, the name which the angel gave Jacob, after having wrestled with him all night at Mahanaim or Peniel (Gen. xxxii. 1, 2, and 28, 29, 30. and Hosea xii. 3.) It signifies *the conqueror of God*, or *a prince of God*; or, according to many of the ancients, *a man who sees God*. By the name of Israel is sometimes understood the person of Jacob; sometimes the whole people of Israel, or the whole race of Jacob; and sometimes the kingdom of Israel, or of the ten tribes, distinct from the kingdom of Judah.

ISRAELITES, the descendants of Israel; who were at first called *Hebrews*, by reason of Abraham, who came from the other side of the Euphrates; and afterwards *Israelites*, from Israel the father of the twelve patriarchs; and lastly *Jews*, particularly after their return from the captivity of Babylon, because the tribe of Judah was then much stronger and more numerous than the other tribes, and foreigners had scarce any knowledge of this tribe.

ISSACHAR, one of the divisions of Palestine by tribes; lying to the south of Zabulon, so as by a narrow slip to reach the Jordan, between Zabulon and Manasseh, Josh. xix. But whether it reached to the sea, is a question; some holding that it did: an assertion not easy to be proved, as Joshua makes no mention of the sea in this tribe, nor does Josephus extend it farther than to mount Carmel; and in Josh. xvii. 10. Asher is said to touch Manasseh on the north, which could not be if Issachar extended to the sea.

ISSEL, or YSSEL, a river of the United Provinces, which rises in Westphalia, runs N. by Doesburg, afterward by Zutphen, Deventer, and Campen, and soon falls into the Zuider-Zee, by two mouths.

ISSEL, or YSSEL, THE LITTLE, another river of the United Provinces, which waters Ysselstein, Montfort, and Gouda; and falls into the Maese, a mile and a half above Rotterdam.

ISSEQUIBO, a flourishing settlement of the Dutch in S. America, contiguous to that of Demarary, and about three leagues W. of the town of Surinam. It was taken by the English in 1781, but restored by the treaty of peace in 1783.

ISSOIRE, an ancient town of France, in the department of Puy de Dome and late province of Auvergne. At Vernet, near this town, are found amethysts, of as beautiful a colour as those of the East, but not so hard. Issoire is seated on the river Couze, near the Allier, 13 miles S. of Clermont. E. lon. 3. 15. N. lat. 45. 34.

ISSOUDUN, a handsome town of France, in the department of Indre and late province of Berry, with a castle. Its trade is in wood, cattle, cloth, hats, and stockings. It is seated on the river Theols, partly on a plain, and partly on an eminence, 17 miles S. W. of Bourges, and 155 S. of Paris. S. lon. 2. 6. N. lat. 46. 47.

ISSUE, in common law, has various applications; being

sometimes taken for the children begotten between a man and his wife—sometimes, for profits growing from amercements or fines—sometimes, for profits of lands and tenements—but more frequently for the point or matter depending in suit, whereupon the parties join, and put their cause to the trial of the jury. In all these occasions, issue has but one signification, which is, an effect of a cause preceding; as the children are the effect of the marriage between the parents; the profits growing to the king or lord, from the punishment of any man's offence, are the effect of his transgression; the point referred to the trial of twelve men, is the effect of pleading, or process. See *PLEA and Issue*.

ISSUES, in surgery, are little ulcers made designedly by the surgeon in various parts of the body, and kept open by the patient, for the preservation and recovery of his health.

ISSUS, now AJAZO, a town of Cilicia in Natolia, with a harbour on the Levant Sea, a little to the north of Scanderoon. E. lon. 36. 25. N. lat. 36. 56. Near this place, in a difficult pass between the mountains and the sea, Alexander the Great fought his second battle with Darius. One great cause of the defeat which the Persians received here was the bad conduct of their monarch, who led his numerous forces into a narrow place, where they had not room to act.

ISTHMA, or ISTHMIAN Games; one of the four solemn games which were celebrated every fifth year in Greece. They had the name from the Isthmus of Corinth, where they were celebrated. In their first institution, according to Pausanias, they consisted only of funeral rites and ceremonies in honour of Melicertes: but Theseus afterwards, as Plutarch informs us, in emulation of Hercules, who had appointed games at Olympia in honour of Jupiter, dedicated those to Neptune, his reputed father, who was regarded as the particular protector of the isthmus and commerce of Corinth. The same trials of skill were exhibited here as at the other three sacred games; and particularly those of music and poetry. These games, in which the victors were only rewarded with garlands of pine-leaves, were celebrated with great magnificence and splendor as long as paganism continued to be the established religion of Greece; nor were they omitted even when Corinth was sacked and burnt by Mummius the Roman general; at which time the care of them was transferred to the Sicyonians, but was restored again to the Corinthians when their city was rebuilt.

ISTHMUS, a narrow neck, or slip of ground, which joins two continents; or joins a peninsula to the terra firma, and separates two seas. See PENINSULA. The most celebrated isthmuses are, that of Panama or Darien, which joins North and South America; that of Suez, which connects Asia and Africa; that of Corinth, or Peloponnesus, in the Morea; that of Crim-Tartary, otherwise called *Taurica Chersonesus*; that of the peninsula Romania, and Erisso, or the isthmus of the Thracian Chersonesus, twelve furlongs broad, being that which Xerxes undertook to cut through. The ancients had several designs of cutting the isthmus of Corinth, which is a rocky hillock about ten miles over; but they were all in vain, the invention of sluices being not then known. There have been attempts too for cutting the isthmus of Suez, to make a communication between the Red and Mediterranean Sea: but these also failed; and in one of them, a king of Egypt is said to have lost 120,000 men.

ISTRIA, a peninsula of Italy, in the territory of Venice, lying in the north part of the Adriatic sea. It is bounded by Carniola on the north: and on the south, east, and west, by the sea. The air is unwholesome, especially near the coast; but the soil produces plenty of wine, oil, and pastures; there are also quarries of fine marble. One part of it belongs to the Venetians, and the other to the house of Austria. Cabo d'Istria is the capital town.

ITALIAN, the language spoken in Italy. See the article LANGUAGE. This tongue is derived principally from the Latin;

and of all the languages formed from the Latin, there is none which carries with it more visible marks of its origin than the Italian. It is accounted one of the most perfect among the modern tongues. It is complained, indeed, that it has too many diminutives and superlatives, or rather augmentatives; but without any great reason: for, if those words convey nothing farther to the mind than the just ideas of things, they are no more faulty than our pleonasm and hyperboles.

The language corresponds to the genius of the people, who are slow and thoughtful: accordingly, their language runs heavily, though smoothly; and many of their words are lengthened out to a great degree. They have a great taste for music, and, to gratify their passion this way, have altered abundance of their primitive words; leaving out consonants, taking in vowels, softening and lengthening out their terminations, for the sake of the cadence. Hence the language is rendered extremely musical, succeeds better than any other in operas and some parts of poetry: but it fails in strength and nervousness; and a great part of its words, borrowed from the Latin, become so far disguised, that they are not easily known again.

The multitude of sovereign states into which Italy is divided, has given rise to a great number of different dialects in that language; which, however, are all good in the place where they are used. The Tuscan is usually preferred to the other dialects, and the Roman pronunciation to that of the other cities; whence the Italian proverb, *Lingua Toscana in bocca Romana*. The Italian is generally pretty well understood throughout Europe; and is frequently spoken in Germany, Poland, and Hungary. At Constantinople, in Greece, and in the ports of the Levant, the Italian is used as commonly as the language of the country: indeed in those places it is not spoken so pure as in Tuscany, but it is corrupted with many of the proper words and idioms of the place; whence it takes a new name, and is called *Frank Italian*.

ITALIC CHARACTER, in printing. See LETTER.

ITALICA, in ancient geography, a town of Bætica in Spain, built by Scipio Africanus, after finishing the Spanish war, for the reception of the wounded soldiers. At first it was a municipium; afterwards a colony: which was a matter of wonder to the emperor Adrian, the privileges of a municipium being beyond those of a colony (Gellius). Famous for being the birth-place of the emperors Trajan and Adrian, and of the poet Silius Italicus. Now *Sevilla Vieja*, scarce four miles from Seville; a small village of Andalusia on the Guadalquivir.—*Corfinium* in Italy was thus also called.

ITALY, one of the finest countries of Europe, lying between 7° and 19° E. lon. and 38° and 46° of N. lat. On the North, N. W. and N. E. it is bounded by France, Switzerland, the country of the Grisons, and Germany; on the E. by the gulph of Venice; and on the S. and W. by the Mediterranean; its figure bearing some resemblance to that of a boot. Its length, from Aousta, at the foot of the Alps, in Savoy, to the utmost verge of Calabria, in the kingdom of Naples, is about 600 miles; but its breadth is very unequal, in some places near 400 miles, in others not above 25 or 30. It is the most celebrated country in Europe, having been formerly the seat of the Roman empire, and, afterward, of that astonishing universal usurpation, the spiritual dominion of the Pope. Italy is divided into a great number of states, which differ much in extent and importance. Between the confines of France and Switzerland, on the W. and N. are the continental dominions of the king of Sardinia, namely, Piedmont, Savoy, Montferrat, part of the Milanese, and Oneglia. To the N. E. are the territories of Venice, which are enumerated under that article. South of these, are the Italian dominions of the Emperor, namely, part of the Milanese, and the Mantuan. South of these, are Modena, Mirandola and Reggio, belonging to the duke of Modena. West of these, are the duchies of Parma, Placentia,

and Guastalla, whose sovereign is of the house of Bourbon. South of Parma lies the republic of Genoa, and S. E. of this that of Lucca. Hence extends, along the coast of the Mediterranean, the grand duchy of Tuscany, whose sovereign is brother to the present emperor of Germany. The Ecclesiastical State, or territory of the Pope, lies principally to the E. and S. E. of Tuscany, between the gulph of Venice and the Mediterranean; and the remainder of Italy, which occupies the whole southern extremity, is the kingdom of Naples, with its dependent islands, of which Sicily is the principal. The air of Italy is very different, according to the different situations of the countries it contains. In those on the N. side of the Apennines, it is more temperate; but on the S. it is very warm. The air of the Campagna of Rome, and of the Ferrarese, is said to be unwholesome; which is owing to the lands not being duly cultivated, nor the marshes drained. That of the other parts is generally pure, dry, and healthy. In summer the heat is very great in the kingdom of Naples, and would be almost intolerable, if it were not mitigated by the sea-breezes. The principal rivers are the Po, Tiber, Arno, Adige, and Var; and there are several fine lakes, as the Maggiore, Lugano, Como, Garda, Perugia, Bracciano, and Celano. As there are a number of rivers in Italy, besides those mentioned above, the soil, in general, is very fertile. It produces a great variety of wines, and the best oil in Europe; excellent silk in abundance; corn of all sorts, but not in such plenty as in other countries; oranges, lemons, citrons, pomegranates, almonds, raisins, sugar, innumerable mulberry trees, figs, peaches, nectarines, apricots, pears, apples, filberds, chestnuts, &c. Most of these fruits were first imported by the Romans from Asia Minor, Greece, Africa, and Syria, and were not the natural products of the soil. The tender plants are sheltered, in winter, on the N. side of the Apennines; but on the S. side they have no need of that precaution. This country also yields good pasture, and abounds with cattle, sheep, goats, buffaloes, wild boars, mules and horses. The forests are well stored with game; and the mountains have not only mines of iron, lead, alum, sulphur, marble of all sorts, alabaster, jasper, porphyry, &c. but also gold and silver; with a great variety of aromatic herbs, trees, shrubs, and evergreens, as thyme, lavender, laurel, wild olive trees, tamarinds, junipers, oaks, and pines. Wine, oil, perfumes, fruits, and silks, are the principal articles of exportation; and great sums of money are expended by travellers in the purchase of pictures, curiosities, relics, antiquities, &c. The Italians are generally well-proportioned; but of their complexion they cannot boast. With respect to dress, they follow the fashions of the countries on which they border, or to which they are subject; namely, those of France, Spain, and Germany. As to their genius and taste in architecture, painting, carving, and music, they are thought to excel greatly the other nations of Europe; but their music, perhaps, is too soft and effeminate to merit all the praises bestowed upon it; and their houses, in respect to convenience, are far inferior to those of England. No country has produced better politicians, historians, poets, painters, and sculptors; that is, since the revival of the arts and sciences, exclusive of those of ancient times. The Italians are very affable, courteous, ingenious, sober, and ready-witted; but extremely jealous, vindictive, lascivious, ceremonious, and superstitious. In respect to jealousy, indeed, we are told, that a very extraordinary change has taken place, and that the Italians are now not less indulgent and complaisant to their wives, than the most polite husbands even in France. In their temper they seem to be a good medium between the French and Spaniards; neither so gay and volatile as the one, nor so grave and solemn as the other. Boiled snails, served up with oil and pepper, or fried in oil and the hinder parts of frogs, they reckon dainty dishes. Kites, jackdaws, hawks, and magpies, are also eaten, not only by the common people, but by the better sort.

Wine, cooled by ice or snow, is drunk here both in summer and winter. The women affect yellow hair, as did formerly the Roman ladies and courtezans: they also use paints and washes, both for their hands and face. The established religion of the country is the Roman Catholic. Their language is a corruption of the Latin, and is said to be spoken in its greatest purity at Florence. It is, indeed, denominated *La Lingua Toscana*.

ITCH, a cutaneous disease, appearing in small watery pustules on the skin; commonly of a mild nature, though sometimes attended with blotches and ulceration of the skin. The slightest application of sulphur mixed with a little cream, is sufficient for the cure; provided the patient wear the shirt he first dresses in for a week or more. A new crop of eruptions very commonly takes place, but a repetition of the sulphur is not necessary on that account; for the whole business is accomplished by a single application of the sulphur ointment. Mercury, applied either in the form of ointment or lotion, cures the itch; as does also the powder of white hellebore root, and some other stimulating remedies, mixed with any unctuous substance.

ITCH-*Insect*. See ACARUS. In speaking of the manner of finding these insects in the itch, Fabricius observes, that the failure of many who have sought for them has been owing to their having expected to meet with them in the larger vesicles that contain a yellowish fluid like pus; in these, however, he tells us, he has never found them, but in those pustules only which are recent, and contain only a watery fluid. We must, therefore, he observes, not expect to find them in the same proportionate number in patients who for many months have been afflicted with the disease, as in those in whom its appearance is recent, and where it is confined to the fingers and wrists. The cause of this difference with respect to the pustules, he conjectures, may be owing to the death of the insect after it has deposited its eggs.

A small transparent vesicle being found, a very minute white point, distinct from the surrounding fluid, may be discovered, and very often even without the assistance of a glass; this is the insect, which may be easily taken out on the point of a needle or a penknife, and when placed on a green cloth may be seen much more distinctly, and observed to move.

The author remarks, that even before such a transparent vesicle is formed, we may often discover traces of the insect on the fingers or hands, in a reddish streak or furrow, which is occasioned by the acarus; and he adds, that it is even more usual to find it in these furrows than in the pustules themselves. He tells us, that a friend of his at Hanover (who had the itch in a slight degree, and to whose accurate enquiries with an excellent microscope he acknowledges himself much indebted) found several insects in such furrows. Two of the longest of the furrows were about an inch in extent. They seemed to be thoroughly dry, but exhibited here and there very minute shining and transparent spots. These spots, however, were not at all elevated above the surface of the skin; and although several of them were opened and examined, no insect was found in them. These furrows he has observed only on the hands and fingers, having in vain sought for them on the legs and other parts of the body, in his children, who had the itch in a high degree.

ITEA, in botany; a genus of the monogynia order, belonging to the pentandria class of plants; and in the natural method ranking with those of which the order is doubtful. The petals are long, and inserted into the calyx; the capsule unilocular and bivalved. There is but one species, a native of North America. It grows by the sides of rivers, and in other parts where the ground is moist. It rises to the height of eight or ten feet, sending out many branches garnished with spear-shaped leaves, placed alternately and slightly sawed on their edges, of a light green colour. At the extremity of the branches are produced fine spikes of white flowers three or four

inches long, standing erect. When these shrubs are in vigour, they will be entirely covered with flowers, so that they make a beautiful appearance during the flowering season, which is July. They are propagated by layers, and are not injured by the cold of this climate; but are apt to die in summer, if they are planted on a dry gravelly soil. The shoots should be laid down in autumn, and will be rooted in one year.

ITHACA, in ancient geography, an island in the Ionian sea, on the coast of Epirus; the country of Ulysses, near Dulichium, with a town and port situated at the foot of mount Neius. According to Pliny it is about 25 miles in compass; according to Artemidorus only 10; and is now found to be only eight miles round. It is now uninhabited, and called *Jabaco*.

ITINERARY, ITINERARIUM; a journal or an account of the distances of places. The most remarkable is that which goes under the names of *Antoninus* and *Æthicus*; or, as Barthius found in his copy, *Antoninus Æthicus*; a Christian writer, posterior to the times of Constantine. Another called *Hierosolymitanum*, from Bourdeaux to Jerusalem, and from Hieraclea through Aulona and Rome to Milan, under Constantine. *Itinerarium* denotes a day's march.

ITIUS, PORTUS, in ancient geography, the *crux geographorum*, such being the difficulty of ascertaining its position. It would be endless to recite the several opinions concerning it, with the several reasons advanced in support of them. Three ports are mentioned by Cæsar; two without any particular name, *viz.* the Higher and the Lower, with respect to the *Portus Itius*. Calais, Boulogne, St. Omer, and Whitland, have each in their turn had their several advocates. Cæsar gives two distinctive characters or marks which seem to agree equally to Boulogne and Whitland, namely, the shortness of the passage, and the situation between two other ports; therefore nothing can with certainty be determined about the situation of the *Portus Itius*.

ITTIGIUS (THOMAS), a learned professor of divinity at Leipzig, and son of John Ittigius, professor of physic in the same university. He first published a Treatise upon Burning Mountains; after which he became a minister, and exercised that function in various churches there. He furnished several papers in the Leipzig Acts, besides publishing some historical works and dissertations. He died in 1716.

ITYS, in fabulous history, a son of Tereus king of Thrace, by Procne daughter of Pandion king of Athens. He was killed by his mother when he was about six years old, and served up before his father. He was changed into a pheasant, his mother into a swallow, and his father into an owl.

ITZECUINTEPOTZOTLI, or HUNCH BACKED DOG, a Mexican quadruped similar to a dog, (See pl. 22.) as large as a Maltesian dog, the skin of which is varied with white, tawny, and black. Its head is small in proportion to its body, and appears to be joined directly to it on account of the shortness and greatness of its neck; its eyes are pleasing, its ears loose, its nose has a considerable prominence in the middle, and its tail is so small that it hardly reaches half way down its leg; but the characteristic of it is a great hunch which it bears from its neck to its rump. The place where this quadruped most abounds is the kingdom of Michuacan, where it is called *Ahora*.

ITZEHOA, an ancient and handsome town of Germany, in the circle of Lower Saxony, and duchy of Holstein. It belongs to the king of Denmark, and is seated on the river Stoer, in E. lon. 9. 25. N. lat. 54. 8.

IVA, in botany; a genus of the pentandria order, belonging to the monœcia class of plants; and in the natural method ranking under the 49th order, *Compositæ*. The male calyx is common and triphyllous; the florets of the disc monopetalous and quinquefid; the receptacle divided by small hairs. There is no female calyx nor corolla; but five florets in the radius; two long styles; and one naked and obtuse seed.



IVAHAH is the name of one of the canoes or boats used by the islanders of the South Sea for short excursions to sea: it is wall-sided and flat-bottomed. These boats are of different sizes, their length being from 72 feet to 10: but their breadth is by no means in proportion; for those of ten feet are about a foot wide, and those of more than 70 are scarcely two. The fighting-ivahah is the longest, with its head and stern considerably raised above the body in a semicircular form: the stern is sometimes 17 or 18 feet high. When they go to sea, they are fastened together side by side, at the distance of about three feet, by strong poles of wood laid across and lashed to the gun-wales. On these, in the fore-part, a stage or platform is raised, about 10 or 12 feet long, somewhat wider than the boats, and supported by pillars about six feet high: on this stage are ranged the fighting men, whose missile weapons are slings and spears; and below the stage the rowers sit. The fishing ivahahs are from 40 feet long to 10; those of 25 feet and upwards occasionally carry sail. The travelling ivahah is always double, and furnished with a small neat house about five or six feet broad, and six or seven feet long.

JUAN DE LA FRONTERA, (St.) a town of S. America, in Chili, in the province of Chiquito, near the lake Guanacho. The territory of this town is inhabited by 20,000 native Americans, who are tributary to Spain. It contains mines of gold, and a kind of almonds that are very delicate. It is seated at the foot of the Andes, 98 miles N. E. of St. Jago. W. lon. 68. 55. S. lat. 33. 25.

JUAN DE PUERTO RICO, (St.) an island of the West Indies, 50 miles E. of Hispaniola. By the English it is called *Porto Rico*, but improperly, as the Spanish word for a port is *Puerto*. It is 100 miles in length, and 50 in breadth. It belongs to the Spaniards, and is full of very high mountains, and extremely fertile valleys, interspersed with woods, and well watered by springs and rivulets. It produces sugar, rum, ginger, corn, and fruits, partly proper to the climate, and partly introduced from Spain. Besides, there are so many cattle, that they often kill them for the sake of the skins alone. Here are a great number of uncommon trees, and there is a little gold in the N. part of the island. It is commonly said, that the air is healthy, and yet, in the reign of queen Elizabeth, the earl of Cumberland, when he had taken this island, lost most of his men by sickness, and, on that account, was forced to abandon it. It is subject to storms and hurricanes, like the rest of these islands. The capital is of the same name. W. lon. 67. 4. N. lat. 18. 17.

JUAN DE PUERTO RICO, (St.) the capital of the island of the same name, with a good harbour, defended by several forts, and a bishop's see. It is seated on the north coast of the island, 200 miles from St. Domingo. W. lon. 69. 1. N. lat. 18. 29.

JUAN Fernandez, an island in the great South Sea, in S. lat. 33. 40. and W. lon. 78. 30. from London. It was formerly a place of resort for the buccaneers who annoyed the western coast of the Spanish continent. They were led to resort hither from the multitude of goats which it nourished; to deprive their enemies of which advantage, the Spaniards transported a considerable number of dogs, which, increasing greatly, have almost extirpated the goats, who now only find security among the steep mountains in the northern parts, which are inaccessible to their pursuers. There are instances of two men living, at different times, alone on this island for many years; the one a Musquito Indian; the other Alexander Selkirk, a Scotchman, who was, after five years, taken on board an English ship, which touched here in about 1710, and brought back to Europe. From the history of this recluse, Daniel de Foe is said to have conceived the idea of writing the *Adventures of Robinson Crusoe*. This island was very propitious to the remains of Commodore Anson's Squadron in 1741, after having been buffeted with tempests, and debilitated by an inveterate

rate scurvy, during a three months passage round Cape Horn: they continued here three months; during which time the dying crews, who on their arrival could scarcely with one united effort heave the anchor, were restored to perfect health. Captain Carteret, in the *Swallow*, in 1767, having met with many difficulties and impediments in his passage into the South Sea, by the Straits of Magellan, attempted to make this island in order to recruit the health of his men; but he found it fortified by the Spaniards, and therefore chose rather to proceed to the island of Masafuero. But M. de Bougainville that same year is said to have touched here for refreshments, although in the narrative of the voyage the fact is cautiously suppressed. This island is not quite 15 miles long, and about six broad; its only safe harbour is on the north side. It is said to have plenty of excellent water, and to abound with a great variety of excellent vegetables highly antiscorbutic; besides which, Commodore Anson sowed a variety of garden-seeds, and planted the stones of plums, apricots and peaches, which he was many years afterwards informed had thriven greatly; and now doubtless furnish a very valuable addition to the natural productions of this spot. Vast shoals of fish of various kinds frequent this coast, particularly cod of a prodigious size; and it is said in not less abundance than on the banks of Newfoundland. There are but few birds here, and those few are of species well known and common.

JUAN DE ULHUA, (St.) an island of N. America, lying in the gulf of Mexico, near Vera Cruz, in New Spain. It was discovered in 1518, by Grijelva. W. lon. 97. 25. N. lat. 19. 12.

JUAN Blanco. See **PLATINA**.

JUBA, a king of Numidia and Mauritania. He had succeeded his father Hiempsal, and he favoured the cause of Pompey against Julius Cæsar. He defeated Curio, whom Cæsar had sent to Africa, and after the battle of Pharsalia he joined his forces to those of Scipio. He was conquered in a battle at Thapsus, and totally abandoned by his subjects. He killed himself with Petreus, who had shared his good fortune and his adversity, in the year of Rome 707. His kingdom became a Roman province, of which Sallust was the first governor.

JUBA II. son of the former, was led among the captives to Rome to adorn the triumph of Cæsar. His captivity was the source of the greatest honours; and his application to study procured him more glory than he would have obtained from the inheritance of a kingdom. He gained the hearts of the Romans by the courteousness of his manners; and Augustus rewarded his fidelity by giving him in marriage Cleopatra the daughter of Anthony, and conferring upon him the title of *king*, and making him master of all the territories which his father once possessed, in the year of Rome 723. His popularity was so great, that the Mauritians rewarded his benevolence by making him one of their gods. The Athenians raised him a statue, and the Æthiopians worshipped him as a deity. Juba wrote an history of Rome in Greek, which is often quoted and commended by the ancients. Of it only few fragments remain. He also wrote on the history of Arabia, and the antiquities of Assyria, chiefly collected from Berofus. Besides these he composed some treatises upon the drama, Roman antiquities, the nature of animals, painting, grammar, &c. now lost.

JUBILEE, among the Jews, denotes every fiftieth year; being that following the revolution of seven weeks of years; at which time all the slaves were made free, and all lands reverted to their ancient owners. The jubilees were not regarded after the Babylonish captivity.—The word, according to some authors, comes from the Hebrew, *jobel*, which signifies *fifty*: but this must be a mistake, for the Hebrew *jobel* does not signify fifty; neither do its letters, taken as cyphers, or according to their numerical power, make that number; being 10, 6, 2,

and 30, that is 48.—Others say, that *jobel* signifies a *ram*, and that the jubilee was thus called, because proclaimed with a ram's horn, in memory of the ram that appeared to Abraham in the thicket. Masius chooses to derive the word from *jubal*, the first inventor of musical instruments, which, for that reason, were called by his name; whence the words *jobel* and *jubilee* came to signify the year of deliverance and remission, because proclaimed with the sound of one of those instruments, which at first was no more than the horn of a ram. Others derive *jobel* from *יָבֵל*, *al*, in *hiphil* *הִבֵּיל*, *hobil*, which signifies to recall or return; because this year restored all slaves to their liberty, &c. The institution of this festival is in Lev. xxv. 8. 17.

The learned are divided about the year of jubilee; some maintaining that it was every forty-ninth, and others that it was every fiftieth year. The ground of the former opinion is chiefly this, that, the forty-ninth year being of course a sabbatical year, if the jubilee had been kept on the fiftieth, the land must have had two sabbaths, or have lain fallow two years, which, without a miracle, would have produced a dearth. On the other hand, it is alleged, that the Scripture expressly declares for the fiftieth year, Lev. xxv. 10, 11. And besides, if the jubilee and sabbatical year had been the same, there would have been no need of a prohibition to sow, reap, &c. because this kind of labour was prohibited by the law of the sabbatical year, Lev. xxv. 4, 5. The authors of the Universal History, book i. chap. 7. note R, endeavour to reconcile these opinions, by observing, that as the jubilee began in the first month of the civil year, which was the seventh of the ecclesiastical, it might be said to be either the forty-ninth or the fiftieth, according as one or other of these computations was followed. The political design of the law of the jubilee was to prevent the too great oppressions of the poor, as well as their being liable to perpetual slavery. By this means a kind of equality was preserved through all the families of Israel, and the distinction of tribes was also preserved, that they might be able, when there was occasion, on the jubilee year, to prove their right to the inheritance of their ancestors. It served also, like the Olympiads of the Greeks, and the Lustra of the Romans, for the readier computation of time. The jubilee has also been supposed to be typical of the gospel state and dispensation, described by Isaiah lxi. ver. 1, 2. in reference to this period, as the "acceptable year of the Lord."

JUBILEE, in a more modern sense, denotes a grand church solemnity or ceremony, celebrated at Rome, wherein the pope grants a plenary indulgence to all sinners; at least to as many as visit the churches of St. Peter and St. Paul at Rome.

The jubilee was first established by Boniface VII. in 1300, in favour of those who should go *ad limina apostolorum*; and it was only to return every hundred years. But the first celebration brought in such store of wealth to Rome, that the Germans called this the *golden year*; which occasioned Clement VI. in 1343, to reduce the period of the jubilee to fifty years. Urban VI. in 1389, appointed it to be held every thirty-five years, that being the age of our Saviour; and Paul II. and Sixtus IV. in 1475, brought it down to every twenty-five, that every person might have the benefit of it once in his life. Boniface IX. granted the privilege of holding jubilees to several princes and monasteries: for instance, to the monks of Canterbury, who had a jubilee every fifty years; when people flocked from all parts to visit the tomb of Thomas a Becket. Jubilees are now become more frequent, and the pope grants them as often as the church or himself have occasion for them. There is usually one at the inauguration of a new pope. To be entitled to the privileges of the jubilee, the bull enjoins fastings, alms, and prayers. It gives the priests a full power to absolve in all cases, even those otherwise reserved to the pope:

to make commutations of vows, &c. in which it differs from a *plenary indulgence*. During the time of jubilee, all other indulgences are suspended.

One of our kings, viz. Edward III. caused his birth-day to be observed in manner of a jubilee, when he became fifty years of age, in 1362, but never before or after. This he did by releasing prisoners, pardoning all offences except treason, making good laws, and granting many privileges to the people.

There are particular jubilees in certain cities, when several of their feasts fall on the same day: at Puy en Velay, for instance, when the feast of the Annunciation happens on Good-Friday; and at Lyons, when the feast of St. John Baptist concurs with the feast of Corpus Christi. In 1640, the Jesuits celebrated a solemn jubilee at Rome, that being the centenary or hundredth year from their institution; and the same ceremony was observed in all their houses throughout the world.

JUCATAN, or YUCATAN, a large province of North-America in New Spain, which is a peninsula. It is over against the island of Cuba, and contains a large quantity of timber proper for building ships; as also sugar, cassia, and Indian corn. The original inhabitants are few, they having been very ill used by the Spaniards. Merida is the capital town. It is a flat level country, and is very unhealthy; which may be owing to the frequent inundations.

JUDAH, the fourth son of Jacob, and father of the chief of the tribes of the Jews distinguished by his name, and honoured by giving birth to the Messiah, died 1636 B. C.

JUDAH *Hakkadosh*, or the Saint, a rabbi celebrated for his learning and riches, lived in the time of the Emperor Antoninus, and was the friend and preceptor of that prince. Leo of Modena, a rabbi of Venice, tells us, that rabbi Judah, who was very rich, collected about 26 years after the destruction of the temple, in a book which he called the *Mishna*, the constitutions and traditions of the Jewish magistrates who preceded him. But as this book was short and obscure, two Babylonish rabbis, Rabbina and Ase, collected all the interpretations, disputes, and additions, that had been made until their time upon the *Mishna*, and formed the book called the *Babylonish Talmud*, or *Gemara*; which is preferable to the Jerusalem Talmud, composed some years before by rabbi Jochanan of Jerusalem. The *Mishna* is the text of the Talmud; of which we have a good edition in Hebrew and Latin by Surenhusius, with notes, in 3 vols. folio. It were to be wished the same had been done to the *Gemara*.

The Kingdom of JUDAH was of small extent compared with that of the kingdom of Israel; consisting only of two tribes, Benjamin and Judah: its east boundary, the Jordan; the Mediterranean its west, in common with the Danites, if we except some places recovered by the Philistines, and others taken by the kings of Israel; on the south, its limits seem to have been contracted under Hadad of the royal progeny of Edom. 1 Kings xi. 14.

Tribe of JUDAH, one of the 12 divisions of Palestine by tribes (Josh. xv.), having Idumea on the south, from the extremity of the Lacus Asphaltites, also the Wilderness of Zin, Cadeibarnena, and the brook or river of Egypt; on the east, the said lake; on the west, the Mediterranean; and on the north, the mouth of the said lake; where it receives the Jordan, Bethsemes, Thimna, quite to Ekron on the sea.

JUDAISM, the religious doctrines and rites of the Jews. See JEW.

JUDAS MACCABEUS, a celebrated general of the Jews, renowned for his many victories over his enemies, at last slain in battle 261 B. C. His exploits are recorded by Josephus in his *History of the Jews*.

JUDAS-Tree. See CERCIS.

JUDIE (St.), brother of St. James the younger, and son of Joseph (Matt. xiii. 55). He preached in Mesopotamia, Ara-

bia, Syria, Idumea; and died in Berytus for the confession of Christ. He wrote that epistle which goes under his name, and after the death of most of the apostles. He was cruelly put to death for reproving the superstition of the Magi.

JUDE, or *the General Epistle of Jude*, a canonical book of the New Testament, written against the heretics, who, by their disorderly lives and impious doctrines, corrupted the faith and good morals of the Christians. St. Jude draws them in lively colours, as men given up to their passions, full of vanity, conducting themselves by worldly wisdom, and not by the spirit of God.

JUDEA, in ancient geography, taken largely, either denotes all Palestine, or the greater part of it; and thus it is generally taken in the Roman history: Ptolemy, Rutilinus, Jerôme, Origen, and Eusebius, take it for the whole of Palestine. Here we consider it as the third part of it on this side the Jordan, and that the southern part is distinct from Samaria and Galilee; under which notion it is often taken, not only in Josephus, but also in the New Testament. It contained four tribes: Judah, Benjamin, Dan, and Simeon, together with Philistia and Idumea; so as to be comprised between Samaria on the north, Arabia Petræa on the south, and to be bounded by the Mediterranean on the west, and by the Lacus Asphaltites, with part of the Jordan, on the east. Josephus divides it into 11 toparchies; Pliny into 10; by which it has a greater extent than that just mentioned. See **PALESTINE**.

JUDENBURG, a handsome and considerable town of Germany, in the circle of Austria, capital of Upper Stiria, with a handsome castle. The public buildings, with the square, are magnificent. It is seated on the river Muehr, 45 miles W. by N. of Gratz, and 100 S. W. of Vienna. E. lon. 14. 26. N. lat. 47. 10.

JUDEX (**MATTHEW**), one of the principal writers of the Centuries of Magdeburg, was born at Tippleswolde, in Misnia, in 1528. He taught theology with great reputation; but met with many disquiets in the exercise of his ministry from party-feuds. He wrote several works, and died in 1604.

JUDGE, a chief magistrate of the law, appointed to hear causes, to explain the laws, and to pass sentence. It is of the utmost consequence to the liberty of the subject that Judges should be independent, as is the case in England. In some countries in which this wholesome regulation has not been adopted, as in Hungary, and various other countries governed by absolute princes, the course of justice is exceedingly corrupted, and the decisions of the Judges influenced by the most shameless bribery.

JUDGES, in Jewish antiquity, certain supreme magistrates who governed the Israelites from the time of Joshua till the reign of Saul. These Judges resembled the Athenian archons or Roman dictators. The dignity of Judge was for life, but not always in uninterrupted succession. God himself, by some express declaration of his will, regularly appointed the judges: but the Israelites did not always wait for his appointment, but sometimes chose themselves a judge in times of danger. The power of the judges extended to affairs of peace and war. They were protectors of the laws, defenders of religion, avengers of all crimes; but they could make no laws, nor impose any new burthens upon the people. They lived without pomp or retinue, unless their own fortunes enabled them to do it; for the revenues of their office consisted in voluntary presents from the people. They continued from the death of Joshua till the beginning of the reign of Saul, being a space of about 330 years.

JUDGES, for ordinary affairs, civil and religious, were appointed by Moses in every city to terminate differences: in affairs of greater consequence, the differences were referred to the priests of Aaron's family, and the judge of the people or

prince at that time established. Moses likewise set up two courts in all the cities, one consisting of priests and Levites, to determine points concerning the law and religion; the other consisting of heads of families, to decide in civil matters.

Book of JUDGES, a canonical book of the Old Testament, so called from its relating the state of the Israelites under the administration of many illustrious persons who were called *judges*, from being both the civil and military governors of the people, and who were raised up by God upon special occasions, after the death of Joshua, till the time of their making a king. In the time of this peculiar polity, there were several remarkable occurrences, which are recorded in this book. It acquaints us with the gross impiety of a new generation which sprung up after the death of Joshua; and gives us a short view of the dispensations of heaven towards this people, sometimes relieving and delivering them, and at others severely chastising them by the hands of their enemies.

Select JUDGES, *Judices selecti*, in antiquity, were persons summoned by the prætor to give their verdict in criminal matters in the Roman courts, as juries do in ours. No person could be regularly admitted into this number till he was 25 years of age. The *Sortitio Judicum*, or impanelling the jury, was the office of the *Judex Quæstionis*, and was performed after both parties were come into court; for each had a right to reject or challenge whom they pleased, others being substituted in their room. The number of the *Judices selecti* varied, according to the nature of the charge. When the proper number appeared, they were sworn, took their places in the *subsellia*, and heard the trial.

JUDGMENT, among logicians, a faculty, or rather act of the human soul, whereby it compares its ideas, and perceives their agreement or disagreement. See **METAPHYSICS**, and **LOGIC**.

JUDGMENT, in law, is the sentence pronounced by the court upon the matter contained in the record. Judgments are of four sorts. First, where the facts are confessed by the parties, and the law determined by the court; as in case of judgment upon *demurrer*: secondly, where the law is admitted by the parties, and the facts disputed; as in the case of judgment on *verdict*: thirdly, where both the fact and the law arising thereon are admitted by the defendant; which is the case of judgments by *confession* or *default*: or, lastly, where the plaintiff is convinced that either fact, or law, or both, are insufficient to support his action, and therefore abandons or withdraws his prosecution; which is the case in judgments upon a *non suit* or *retrahit*.

The judgment, though pronounced or awarded by the judges, is not their determination or sentence, but the determination and sentence of the *law*. It is the conclusion that naturally and regularly follows from the premises of law and fact, which stands thus: Against him who hath rode over my corn, I may recover damages by law; but A hath rode over my corn; therefore I shall recover damages against A. If the major proposition be denied, this is a demurrer in law: if the minor, it is then an issue of fact: but if both be confessed or determined to be right, the conclusion or judgment of the court cannot but follow; which judgment or conclusion depends not therefore on the arbitrary caprice of the judge, but on the settled and invariable principles of justice. The judgment, in short, is the remedy prescribed by law for the redress of injuries; and the suit or action is the vehicle or means of administering it. What that remedy may be, it is indeed the result of deliberation and study to point out; and therefore the style of the judgment is, not that it is decreed or resolved by the court, for then the judgment might appear to be their own; but, "it is considered," *consideratum est per curiam*, that the plaintiff do recover his damages, his debt, his possession, and the like: which implies that the judgment is none of their own; but the

act of law, pronounced and declared by the court, after due deliberation and inquiry. See *Blackst. Comment.* iii. 356.

JUDGMENT, in criminal cases, is the next stage of prosecution, after TRIAL and CONVICTION are past, in such crimes and misdemeanours as are either too high or too low to be included within the benefit of clergy. For when, upon a capital charge, the JURY have brought in their VERDICT guilty, in the presence of the prisoner; he is either immediately, or at a convenient time soon after, asked by the court, if he has any thing to offer why judgment should not be awarded against him. And in case the defendant be found guilty of a misdemeanour (the trial of which may, and does usually, happen in his absence, after he has once appeared), a *capias* is awarded and issued, to bring him in to receive his judgment; and if he absconds, he may be prosecuted even to outlawry. But whenever he appears in person, upon either a capital or inferior conviction, he may at this period, as well as at his arraignment, offer any exceptions to the indictment, in *arrest* or stay of judgment: as for want of sufficient certainty in setting forth either the person, the time, the place, or the offence. And if the objections be valid, the whole proceedings shall be set aside; but the party may be indicted again. Judge Blackstone observes, 1. That none of the statutes of *jeofails*, for amendment of errors, extend to indictments or proceedings in criminal cases; and therefore a defective indictment is not aided by a verdict, as defective pleadings in civil cases are. 2. That, in favour of life, great strictness has at all times been observed, in every point of an indictment. Sir Matthew Hale indeed complains, "that this strictness is grown to be a blemish and inconvenience in the law, and the administration thereof: for that more offenders escape by the over easy ear given to exceptions in indictments, than by their own innocence; and many times gross murders, burglaries, robberies, and other heinous and crying offences, remain unpunished by these unseemly niceties: to the reproach of the law, to the shame of the government, to the encouragement of villainy, and to the dishonour of God." And yet, notwithstanding this laudable zeal, no man was more tender of life than this truly excellent judge.

A pardon also may be pleaded in arrest of judgment: and it has the same advantage when pleaded here as when pleaded upon ARRAIGNMENT; viz. the saving the ATTAINDER, and, of course, the CORRUPTION of blood: which nothing can restore but parliament; when a pardon is not pleaded till after sentence. And certainly, upon all accounts, when a man hath obtained a pardon, he is in the right to plead it as soon as possible. See PARDON.

Praying the benefit of clergy may also be ranked among the motions in arrest of judgment. See *Benefit of Clergy*.

If all these resources fail, the court must pronounce that judgment which the law hath annexed to the crime. Of these some are capital, which extend to the life of the offender, and consist generally in being hanged by the neck till dead; though in very atrocious crimes other circumstances of terror, pain, or disgrace, are superadded: as, in treasons of all kinds, being drawn or dragged to the place of execution; in high treason affecting the king's person or government, enbowelling alive, beheading, and quartering; and in murder, a public dissection. And in case of any treason committed by a female, the judgment is, to be burned alive. But the humanity of the English nation has authorised, by a tacit consent, an almost general mitigation of such parts of these judgments as savour of torture or cruelty: a sledge or hurdle being usually allowed to such traitors as are condemned to be drawn; and there being very few instances (and those accidental or by negligence) of any persons being enbowelled or burned, till previously deprived of sensation by strangling. Some punishments consist in exile or banishment, by abjuration of the realm, or transportation to

New South Wales: others, in loss of liberty, by perpetual or temporary imprisonment. Some extend to confiscation, by forfeiture of lands, or moveables, or both, or of the profits of lands for life: others induce a disability of holding offices or employments, of being heirs, executors, and the like. Some, though rarely, occasion a mutilation or dismembering, by cutting off the hand or ears: others fix a lasting stigma on the offender, by slitting the nostrils or branding in the hand or face. Some are merely pecuniary, by stated or discretionary fines: and, lastly, there are others that consist principally in their ignominy, though most of them are mixed with some degree of corporeal pain; and these are inflicted chiefly for such crimes as either arise from indigence, or render even opulence disgraceful: such as whipping, hard labour in the house of correction, the pillory, the stocks, and the ducking-stool.

Disgusting as this catalogue may seem, it will afford pleasure to a British reader, and do honour to the British laws, to compare it with that shocking apparatus of death and torment to be met with in the criminal codes of almost every other nation in Europe. And it is moreover one of the glories of our law, that the nature, though not always the quantity or degree, of punishment is ascertained for every offence; and that it is not left in the breast of any judge, nor even of a jury, to alter that judgment which the law has beforehand ordained for every subject alike, without respect of persons. For, if judgments were to be the private opinions of the judge men would then be slaves to their magistrates; and would live in society without knowing exactly the conditions and obligations which it lays them under. And, besides, as this prevents oppression on the one hand; so, on the other, it stifles all hopes of impunity or mitigation, with which an offender might flatter himself if his punishment depended on the humour or discretion of the court. Whereas, where an established penalty is annexed to crimes, the criminal may read their certain consequence in that law, which ought to be the unvaried rule, as it is the inflexible judge, of his actions.

JUDGMENT of God. See JUDICIUM Dei.

JUDICATURE, the quality or profession of those who administer justice. This term is also used to signify the extent of the jurisdiction of the judge, and the court wherein he sits to render justice.

JUDICIA CENTUMVIRALIA, in Roman antiquity, were trials before the *Centumviri*, to whom the *prætor* committed the decision of certain matters of inferior nature, like our justices of peace at the quarter sessions. During the *judicia centumviralia*, a spear was stuck up in the forum to signify that the court was sitting.

JUDICIUM CALUMNIE was an action brought against the plaintiff for false accusation. The punishment, upon conviction, was *inustio frontis*, or branding in the forehead. See INUSTIO.

JUDICIUM Dei, *Judgment of God*, was a term anciently applied to all extraordinary trials of secret crimes; as those by arms, and single combat, and the ordeals, or those by fire, or red-hot plough-shares; by plunging the arm in boiling water, or the whole body in cold water; in hopes God would work a miracle, rather than suffer truth and innocence to perish. *Si super defendere non possit, judicio Dei, scil. aqua vel ferro, fiet de eo justitia.*—These customs were a long time kept up even among Christians; and they are still in use in some nations. See BATTEL, ORDEAL, &c.—Trials of this sort were usually held in churches in presence of the bishops, priests, and secular judges; after three days' fasting, confession, communion, and many adjurations and ceremonies described at large by Du Cange.

JUDICIUM Parium denotes a trial by a man's equals, i. e. of peers by peers, and of commoners by commoners. In *magis*

charta it is more than once insisted on as the principal bulwark of our liberties, but especially by chap. 29. that no freeman shall be hurt in either his person or property, *nisi per legale iudicium parium suorum vel per legem terræ*. And this was ever esteemed in all countries a privilege of the highest and most beneficial nature.

JUDICIUM Falsi was an action which lay against the judges for corruption or unjust proceedings.

JUDICIUM Prævaricationis was an action brought against the prosecutor, after the criminal was acquitted, for suppressing the evidence of or extenuating his guilt, rather than urging it home, and bringing it to light.

JUDOIGNE, a town of Austrian Brabant, near which the duke of Marlborough gained that signal victory, in 1706, called the battle of Ramillies. It is seated on the river Gete, 13 miles S. E. of Louvain, and 16 N. of Namur. E. lon. 5. 2. N. lat. 50. 45.

IVEACH, the name of two baronies of Ireland, in the county of Down, and province of Ulster. They are distinguished into Upper and Lower Iveach, and the former is by much the largest barony in that county. The name of *Iveach*, or *Hy Ieack*, is said to be taken from *Achais*, in Irish called *Eachach*, grandfather to king *Coalhpaig*, as much as to say "the territory of Eachach;" for *hy*, in the Irish language, is a common adjective, denoting not only the heads and founders of families, but also the territories possessed by them. Iveach (including both baronies) was otherwise called the *Magennis country*, and in queen Elizabeth's time was governed by Sir Hugh Magennis, esteemed to have been one of the most polite of all the natives in those parts. Through part of this barony runs a chain of mountains considerably high, known by the name of *Iveach mountains*.

IUERNUS, in ancient geography, a town in the south-west of Ireland. Now *Dunkerran*, (Camden); called *Donckyne* by the natives, situated on the river Maire, in the province of Munster.

IUERNUS, or *Iernus*; Ptolemy; a river in the south-west of Ireland. Now called the *Maire* or *Kenmare*, running from east to west, in the province of Munster.

IVES, or *YVES* (St.), a celebrated bishop of Chartres, born in the territory of Beauvais in the 11th century. His merit procured his election to the see of Chartres in 1092, or 1093, under the pontificate of Urban II. who had deposed Geoffroy his predecessor for sundry accusations against him. Ives particularly signalized himself by his zeal against Philip I. who had put away his wife Bertha of Holland, and had taken Bertrade of Montford, wife of Fouques count of Anjou. Afterward he devoted himself wholly to the functions of his ministry; made several religious foundations; and died in 1115. Pope Pius V. permitted the monks of the congregation of Lateran to celebrate the festival of St. Ives on the 20th of May. We have a collection of decrees of his compiling. *Excerptiones ecclesiasticarum regularum*, a *Chronicon*, and 22 sermons; all very valuable pieces, which were collected and published in one volume folio in 1647, by John Baptiste Souciet, canon of Chartres.

IVES (St.), a sea-port town of Cornwall, in England, seated on a bay of the same name; which, being unsafe, is chiefly frequented by fishermen for the taking of pilchards. By this trade, however, and that of Cornish slates, it has thriven greatly, and 20 or 30 sail of ships belong to its harbour. It is a corporation, governed by a mayor, 12 capital and 24 inferior burgesses, with a recorder, town clerk, &c. and it sends two members to parliament. Here is a handsome spacious church, which is often buffeted by the waves of the sea; but the mother church is at Unilant. There is a grammar

school here, which was founded by Charles I. It has two markets in the week, and an annual fair.

IVES (St.), is also the name of a town in Huntingdonshire, 64 miles from London. It has a fine stone bridge over the Ouse, had in the ninth century a mint, and was noted for its medicinal waters. Great part of it was burnt down some years ago, but it was rebuilt. Here is a very good market on Monday for fatted cattle brought from the north; and there are two fairs in the year. Here Oliver Cromwell rented a farm before he was chosen burgess for Cambridge.

JUGERUM, in Roman antiquity, a square of 120 Roman feet; its proportion to the English acre being as 10,000 to 16,097.

JUGLANS, in botany; a genus of the monœcia order, belonging to the polyandria class of plants; and in the natural method ranking under the 50th order, *Amentaceæ*. The male calyx is monophyllous, and squamiform; the corolla divided into six parts; there are 18 filaments: the female calyx is quadrifid, superior; the corolla quadripartite; there are two styles, and the fruit a plum with a furrowed kernel. There are five species, the most remarkable of which is the regia or common walnut. This rises 50 feet high or more, with a large upright trunk, branching into a very large spreading head, with large pinnated leaves, of two or three pair of oval, smooth, somewhat serrated lobes, terminated by an odd one; and monœcious flowers, succeeded by clusters of large green fruit, inclosing furrowed nuts of different shapes and sizes in the varieties, ripening in September and October. Other two species, called the *nigra* and *alba*, or black and white Virginian walnut, are also cultivated in this country, though they are less proper for fruit, having very small kernels.

All the sorts are propagated by planting their nuts, which will grow in any common soil. The nuts being procured in the proper season, in their outer covers or husks it possible, they should be preserved in dry sand until February, and then planted. After two years growth in the seed bed, they are to be taken out, and planted in the nursery, where they must remain till grown five or six feet high, when they must be transplanted where they are finally to remain; but if intended for timber as well as fruit-trees, they ought to be finally transplanted when they have attained the height of three or four feet.

The fruit is used at two different stages of growth; when green to pickle, and when ripe to eat raw. As a pickle, the nuts may be used when about half or three fourths grown, before the outer coat or shell becomes hard; such nuts should be chosen as are most free from specks, and for this purpose they must be gathered by hand. Walnuts are ready for pickling in July and August. They are full ripe in September and October; and are then commonly beat down with long poles, especially on large trees; for, as the walnuts grow mostly at the extremities of the branches, it would be troublesome and tedious to gather them by hand. As soon as gathered, lay them in heaps a few days to heat and sweat, to cause their outer husks, which adhere closely, to separate from the shell of the nuts; then clean them from the rubbish, and deposit them in some dry room for use, covering them over close with dry straw half a foot thick, and they will keep three or four months. They are always readily sold at market, especially in London; where, at their first coming in, they are sold with the husks on, by the sack or bushel; but afterwards are brought clean, and sold both by measure and by the thousand. The wood of the walnut-tree is also very valuable; not indeed where strength is necessary, it being of a very brittle nature; but the cabinet-makers and joiners esteem it highly for several sorts of household furniture and other light works; for, being beautifully veined, it takes a fine polish, and the more knotty it is, the more it is valued for par-

ticular purposes. Walnut-trees are also well adapted for planting round the borders of orchards, where, by their large spreading heads, they will also guard the lesser fruit-trees from boisterous winds. The kernels of the nuts are similar in quality to almonds; but are not like them used in medicine.

The *Juglans alba* mentioned above, which is the North American hickory or walnut-tree, and also several other varieties, yield from their barks, rinds, and nuts, a yellow colour when boiled in water with alum. The tingent power of these is of the same nature as that of the *quercitron* bark, and may be adapted to the use of callico printers, dyers, paper stainers, &c. The hickory bark, however, supplies about one fourth less of colour than the *quercitron*, and is less suitable for mixing directly with the different mordants, and printing or pencilling on linens or cottons.

JUGON, a town of France, in the department of the North Coast, and late province of Brittany, seated on the little river Arqueon, 12 miles from the English Channel.

JUGORA, a considerable province of Muscovy, depending on the government of Archangel. It has the title of a duchy; and is inhabited by a kind of Tartars, who are very savage, and much of the same disposition with the Samoiedes.

JUGULAR, among anatomists, is applied to certain blood-vessels on each side of the neck. See ANATOMY.

JUGULARES, in the Linnæan system, is the name of an order or division of fish, the general character of which is, that they have ventral fins before the pectoral fins. See ZOOLOGY.

JUGUM, an humiliating mode of punishment inflicted by the victorious Romans upon their vanquished enemies. It was thus. They set up two spears, and laying a third across, in the form of a gallows, they ordered those who had surrendered themselves to pass under this ignominious erection, without arms or belts. None suffered the disgrace of passing *sub jugo* but such as had been obliged to surrender.

JUGURTHA, the illegitimate son of Manastabal the brother of Micipsa. Micipsa and Manastabal were the sons of Masinissa, king of Numidia. Micipsa, who had inherited his father's kingdom, educated his nephew with his two sons Adherbal and Hiempsal; but as he saw that the former was of an aspiring disposition, he sent him with a body of troops to the assistance of Scipio, who was besieging Numantia, hoping to lose a youth whose ambition seemed to threaten the tranquillity of his children. His hopes were frustrated; Jugurtha showed himself brave and active, and he endeared himself to the Roman general. Micipsa appointed him successor to his kingdom with his two sons; but the kindness of the father proved fatal to the children. Jugurtha destroyed Hiempsal, and stripped Adherbal of his possessions, and obliged him to fly to Rome for safety. The Romans listened to the well-grounded complaints of Adherbal; but Jugurtha's gold prevailed among the senators, and the suppliant monarch, forsaken in his distress, perished by the snare of his enemy. Cæcilius Metellus was at last sent against Jugurtha; and his firmness and success soon reduced the crafty Numidian, obliging him to fly among his savage neighbours for support. Marius and Sylla succeeded Metellus, and fought with equal success. Jugurtha was at last betrayed by his father-in-law Bocchus, from whom he claimed assistance; and he was delivered into the hands of Sylla 106 years before the Christian era. He was exposed to the view of the Roman people, and dragged in chains to adorn the triumph of Marius. He was afterwards put in a prison, where he died six days after of hunger.

IVICA, the capital of an island of the same name, in the Medite ranean, with a good harbour. E. lon. 1. 25. N. lat. 38. 25.

IVICA, an island of the Mediterranean, 56 miles S. W. of

Majorca. It is about 60 miles in circumference. It is mountainous, but fertile in corn, wine, and fruits; and it is remarkable for the great quantity of salt made here.

JUICE denotes the sap of vegetables, or the liquors of animals. See ANATOMY, BLOOD, PLANTS, SAP, &c. The juices of several plants are expressed to obtain their essential salts, and for several medicinal purposes, with intention either to be used without further preparation, or to be made into syrups and extracts. The general method of extracting these juices is, by pounding the plant in a marble mortar, and then by putting it into a press. Thus is obtained a muddy and green liquor, which generally requires to be clarified, as we shall soon observe. The juices of all plants are not extracted with equal ease. Some plants, even when fresh, contain so little juice, that water must be added while they are pounded, otherwise scarcely any juice would be obtained by expression. Other plants, which contain a considerable quantity of juice, furnish by expression but a small quantity of it, because they contain also much mucilage, which renders the juice so viscid that it cannot flow. Water must also be added to these plants to obtain their juice. The juices thus obtained from vegetables by a mechanical method, are not, properly speaking, one of their principles, but rather a collection of all the proximate principles of plants which are soluble in water; such as the saponaceous extractive matter, the mucilage, the odoriferous principle, all the saline and saccharine substances; all which are dissolved in the water of the vegetation of the plants. Besides these matters, the juice contains some part of the resinous substance, and of the green colouring matter, which in almost all vegetables is of a resinous nature. These two latter substances, not being soluble in water, are only interposed between the parts of the other principles which are dissolved in the juice, and consequently disturb its transparency. They nevertheless adhere together in a certain degree, and so strongly in most juices, that they cannot be separated by filtration alone. When therefore these juices are to be clarified, some previous preparations must be used by which the filtration may be facilitated. Juices which are acid, and not very mucilaginous, are spontaneously clarified by rest and gentle heat. The juices of most antiscorbutic plants abounding in saline volatile principles, may be disposed to filtration merely by immersion in boiling water; and as they may be contained in close bottles, while they are thus heated in a water bath, their saline volatile part, in which their medicinal qualities chiefly consist, may thus be preserved. Fermentation is also an effectual method of clarifying juices which are susceptible of it; for all liquors which have fermented, clarify spontaneously after fermentation. But this method is not used to clarify all juices, because many of them are susceptible of only an imperfect fermentation, and because the qualities of most of them are injured by that process. The method of clarification most generally used, and indispensably necessary for those juices which contain much mucilage, is boiling with the white of an egg. This matter, which has the property of coagulating in boiling water, and of uniting with mucilage, does accordingly, when added to the juice of plants, unite with and coagulate their mucilage, and separates it from the juice in form of scum, together with the greatest part of the resinous and earthy matters which disturb its transparency. And as any of these resinous matters which may remain in the liquor after this boiling with the whites of eggs, are no longer retained by the mucilage, they may easily be separated by filtration. See FILTRATION.

The juices, especially before they are clarified, contain almost all the same principles as the plant itself; because in the operation by which they are extracted, no decomposition happens; but every thing remains, as to its nature, in the same state as in the plant. The principles contained in the juice are

only separated from the grosser oily, earthy, and resinous parts which compose the solid matter that remains under the press. These juices, when well prepared, have therefore the same medicinal qualities as the plants from which they are obtained. They must evidently differ from each other as to the nature and proportions of the principles with which they are impregnated, as much as the plants from which they are extracted differ from each other in those respects.

Most vegetable juices coagulate when they are exposed to the air, whether they are drawn out of the plant by wounds, or naturally run out; though what is called *naturally running out* is generally the effect of a wound in the plant, from a sort of canker, or some other internal cause. Different parts of the same plant yield different juices. The same veins in their course through the different parts of the plant yield juices of a different appearance. Thus, the juice in the root of the cow-parsnip is of a briar-stone colour; but in the stalk it is white.

Among these juices of vegetables which are clammy and readily coagulate, there are some which readily break with a whey. The great wild lettuce, with the small *opium*, yields the greatest plenty of milky juice of any known British plant. When the stalk is wounded with a knife, the juice flows readily out like a thick cream, and is white and ropy; but if these wounds are made at the top of the stalks, the juice that flows out of them is dashed with a purple tinge, as if cream had been sprinkled over it with a few drops of red wine. Some little time after letting this out, it becomes much more purple, and thickens; and finally, the thicker part of it separates, and the thin whey swims at top. The whey or thin part of this separated matter is easily pressed out from the curd by squeezing between the fingers, and the curd will then remain white; and on washing with water, it becomes like rags. The purple whey (for in this is contained all the colour) soon dries into a purple cake, and may be crumbled between the fingers into a powder of the same colour. The white curd being dried and kept for some time, becomes hard and brittle. It breaks with a shining surface like resin, and is inflammable; taking fire at a candle, and burning all away with a strong flame. The same thick part being held over a gentle heat, will draw out into tough long threads, melting like wax. The purple cake made from the whey is quite different from this; and when held to a candle scarce flames at all, but burns to a black coal. The whole virtue of the plant seems also to consist in this thin part of its juice: for the coagulum or curd, though looking like wax or resin, has no taste at all; whereas the purple cake made from the serum is extremely bitter, and of a taste somewhat resembling that of opium.

Of the same kind with the wild lettuce are the throatwort, spurge, and many other plants. These are all replete with a milky juice, which separates into curds and whey like that already described. But this, though a common law of nature, is not universal; for there are many plants which yield the like milky juices without any separation ensuing upon their extravasation. The white juice of the fenchus never separates, but dries into a uniform cake; the common red wild poppy bleeds freely with a milky juice; and the heads or capsules of seed bleed not less freely than the rest of the plant, even after the flower is fallen. This juice, on being received into a shell or other small vessel, soon changes its white to a deep yellow colour, and dries into a cake which seems resinous and oily, but no whey separates from it. The tragopogon, or goat's beard, when wounded, bleeds freely a milky juice; it is at first white, but becomes immediately yellow, and then more and more red, till at length it is wholly of a dusky red. It never separates, but dries together into one cake; and is oily and resinous, but of an insipid taste. The great bindweed also bleeds freely a white juice; the flowers, as well as the stalks and leaves,

affording this liquor. It is of a sharp taste; and as many of the purging plants are of this class, it would be worth trying whether this milk is not purgative.

These juices, as well as the generality of others which bleed from plants, are white like milk; but there are some of other colours. The juice of the greatcelandine is of a fine yellow colour; it flows from the plant of the thickness of cream, and soon dries into a hard cake, without any whey separating from it. Another yellow juice is yielded by the seed-vessels of the yellow centaury in the month of July, when the seeds are full-grown. This is very clammy; it soon hardens altogether into a cake, without any whey separating from it. It sticks to the fingers like birdlime, is of the colour of pale amber, and will never become harder than soft wax if dried in the shade; but if laid in the sun, it immediately becomes hard like resin.—These cakes burn like wax, and emit a very pleasant smell. The great angelica also yields a yellowish juice on being wounded; and this will not harden at all, but if kept several years will still be soft and clammy, drawing out into threads like half-melted resin.

Another kind of juices very different from all these, are those of a gummy nature. Some of these remain liquid a long time, and are not to be dried without the assistance of heat; the others very quickly harden of themselves, and are not inflammable. The gum of the juice of rhubarb-leaves soon hardens; and is afterwards soluble in common water, and sparkles when put into the flame of a candle. The clusters of the common honey-suckle are full of a liquid gum. This they frequently throw out, and it falls upon the leaves, where it retains its own form. The red hairs of the *ros solis* are all terminated by large bladders of a thin watery fluid. This is also a liquid gum; it sticks to the fingers, draws out into long threads, and stands the force of the sun all day. In the centre of each of these dew-drops there is a small red bladder, which stands immediately on the summit of the red hair, and contains a purple juice which may be squeezed out of it. The pinguicula, or butter-wort, has also a gummy matter on its leaves in much greater quantity than the *ros solis*.

Some plants yield juices which are manifestly of an oily nature. These, when rubbed, are not at all of a clammy nature, but make the fingers glib and slippery, and do not at all harden on being exposed to the air. If the stalk of elecampane be wounded, there flows out an oily juice swimming upon a watery one. The stalks of the hemlock also afford a similar oily liquor swimming upon the other; and in like manner the white mullein, the berries of ivy, the bay, juniper, dog-berry tree, and the fruit of the olive, when wounded, show their oil floating on the watery juice. Some of these oily juices, however, harden into a kind of resin. Our ivy yields such a juice very abundantly; and the juice of the small purple-berried juniper is of the same kind, being hard and fat, and not very gummy. If the bark of the common ivy is wounded in March, there will ooze out a tough and greasy matter of a yellowish colour, which, taken up between the fingers, feels not at all gummy or sticking, but melts in handling into a sort of oil, which in process of time hardens and crutts upon the wounds, and looks like brown sugar. It burns with a lasting flame, and smells very strong. The tops of the wild lettuce, and the leaves growing near the tops, if examined with a magnifying glass, show a great number of small bladders or drops of an oily juice of a brownish colour, hardening into a kind of resin; they are easily wiped off when of any size, and are truly an oily juice a little hardened. It is probable also, that the fine blue flour or powder, called the *laes*, upon the surface of our common plums, is no other than such an oily juice exuding from their pores in small particles, and hardening into a sort of resin.

JUJUBES, in the materia medica, the name of a fruit of

the pulpy kind, produced on a tree which Linnæus makes a species of *rhamnus*. See RHAMNUS. The jujubes have been made a general ingredient in pectoral decoctions; but they are now seldom used on these occasions, and are scarce at all heard of in prescription, or to be met with in our shops.

JUL, or JOL, a Gothic word signifying a "sumptuous treat;" and particularly applied to a religious festival, first among the heathens and afterwards among Christians. By the latter it was given to CHRISTMAS; which is still known under the name of *Jul*, or *Yool*, in Denmark, Norway, Iceland, and Sweden; nay, even in the north of Britain; and whence the month of Januarius by the Saxons was styled *Giuli*, i. e. "the Festival." As this feast had originally been dedicated by our heathen ancestors to the Sun, their supreme deity; so the Christians, for the purpose of engaging the minds of their Ethnic (gentile) brethren, ordered it should be celebrated in memory of the birth of Christ: and thus it has been through ages a feast of joy and entertainment. We are indebted to Procopius for the first account of this feast.

JULEP, in pharmacy, a medicine composed of some proper liquor and a syrup or sugar, of extemporaneous preparation without decoction. See PHARMACY.

JULIAN, the famous Roman emperor, styled *the Apostate*, because he professed the Christian religion before he ascended the throne, but afterwards openly embraced Paganism, and endeavoured to abolish Christianity. He made no use of violence, however, for this purpose; for he knew that violent measures had always rendered it more flourishing: he therefore behaved with a politic mildness to the Christians; recalled all who had been banished on account of religion under the reign of Constantius; and undertook to pervert them by his caresses, and by temporal advantages, and mortifications covered over by artful pretences: but he forbade Christians to plead before courts of justice, or to enjoy any public employments. He even prohibited their teaching polite literature; well knowing the great advantages they drew from profane authors in their attacks upon paganism and irreligion. Though he on all occasions showed an outward contempt for the Christians, whom he always called *Galileans*, yet he was sensible of the advantage they obtained by their virtue and the purity of their manners; and therefore incessantly proposed their example to the pagan Priests. At last, however, when he found that all other methods failed, he gave public employments to the most cruel enemies of the Christians, when the cities in most of the provinces were filled with tumults and seditions, and many of them were put to death. Though it has been pleaded by Julian's apologists that the behaviour of the Christians furnished sufficient pretence for most of his proceedings against them, and the animosities among themselves furnished him with the means: that they were continually prone to sedition, and made a merit of insulting the public worship; and, finally, that they made no scruple of declaring, that want of numbers alone prevented them from engaging in an open rebellion. Historians mention, that Julian attempted to prove the falsehood of our Lord's prediction with respect to the temple of Jerusalem; and resolved to have that edifice rebuilt by the Jews, about 300 years after its destruction by Titus: but all their endeavours served only the more perfectly to verify what had been foretold by Jesus Christ; for the Jews, who had assembled from all parts to Jerusalem, digging the foundations, flames of fire burst forth and consumed the workmen. However, the Jews, who were obstinately bent on accomplishing that work, made several attempts; but it is said, that all who endeavoured to lay the foundation perished by these flames, which at last obliged them entirely to abandon the work. Julian being mortally wounded in a battle with the Persians, it is said, that he then caught in his hand some of the blood which flowed from his wound; and throwing it towards heaven,

cried, "Thou, Galilean, hast conquered." But notwithstanding this popular report, Theodoret relates, that Julian discovered a different disposition; and employed his last moments in conversing with Maximus the philosopher, on the dignity of the soul. He died on the following night, aged 32. A particular account of his reign and exploits is recorded in the different *Histories of Constantinople*.

No prince was ever more oppositely represented by different authors; on which account it is difficult to form a true judgment of his real character. It must, however, be acknowledged, that he was learned, liberal, temperate, brave, vigilant, and a lover of justice: but, on the other hand, he had apostatised to paganism; was an enemy to the Christian religion; and was, in fact, a persecutor, though not of the most sanguinary class. We have several of his discourses or orations; some of his letters; a treatise entitled *Misopogon*, which is a satire on the inhabitants of Antioch; and some other pieces, all written in an elegant style. They were published in Greek and Latin by father Petau in 1630 in quarto; and of which Spanheimius gave a fine edition in folio in 1696. His most famous work was that composed against the Christians, of which there are some fragments in Cyril's refutation of it.

JULIAN Period, in chronology, a period so called, as being adapted to the Julian year. See CHRONOLOGY. It is made to commence before the creation of the world. Its principal advantage lies here, that the same years of the cycles of the sun, moon, and indiction, of which three cycles it was made to consist by Joseph Scaliger in 1580, belonging to any year of this period, will never fall together again till after the expiration of 7980 years. There is taken for the first year of this period that which hath the first of the cycle of the sun, the first of the cycle of the moon, and the first of the indiction cycle, and so reckoning on.

The first year of the Christian era is always, in our systems of chronology, the 4714th of the Julian period.—To find what year of the Julian period any given year of Christ answers to: To the given year of Christ add 4713, because so many years of the Julian period were expired A. D. 1; and the sum gives the year of the Julian period sought. On the contrary, having the year of the Julian period given, to find what year of Christ answers thereto: From the year of the Julian period given subtract 4713, and the remainder will be the year sought.

JULIAN (St.), a harbour on the south of Patagonia, in South America, where ships usually touch that are bound to the south seas. S. lat. 48. 15.

JULIEN DU SAULT (St.), a town of France, in the department of Yonne, and late province of Burgundy, seated between two mountains covered with vines, near the river Yonne, five miles from Joigny.

JULIEN (St.), a town of France, in the department of Upper Vienne, and late province of Limosin, 13 miles W. of Limoges.

JULIERS, a duchy in the circle of Westphalia, in Germany, seated between the rivers Maese and Rhine, and bounded by Prussian Gelderland on the north, by the electorate of Trier on the south, by the electorate of Cologne on the east, and by the Netherlands on the west. It is about 60 miles long, and 30 broad; and is a very plentiful country, abounding in cattle, corn, and fine meadows, and is well supplied with wood; but it is most remarkable for a fine breed of horses, and wood for dyeing, which is gathered here in abundance. The chief towns are Juliers, Aix-la-Chapelle, Duren, Munster-Eifel, Bedbur, Wesinburg, and Lasteren. It is subject to the Elector Palatine, with the consent of the king of Prussia and heretofore of Poland.

JULIERS, a city, capital of the duchy of Juliers in Westphalia. Some think this city was founded by Julius Cæsar or Julia

Agrippina; but this is much questioned by others, because it is not mentioned before Antoninus's Itinerary and Theodosius's Tables. The town is small, but well fortified, and neatly built; the houses are of brick, and the streets broad and regular. The citadel is large and very strong, containing a palace of the ancient dukes, and a spacious piazza. In the suburbs there is a monastery of Carthusians, nobly endowed by several dukes of Juliers. The town is but poorly inhabited, though they have a fine woollen manufactory in this country, and likewise another of linen. It was taken by prince Maurice of Nassau in 1610, and by the Spaniards in 1622. It is seated on the river Roer, in E. lon. 6. 35. N. lat. 50. 55.

JULIO ROMANO. See ROMANO.

JULIUS CÆSAR. See CÆSAR.

JULIUS II. (Julian de la Rovere), pope, remarkable for his warlike disposition, and his political negotiations: by the latter, he engaged the principal powers of Europe to league with him against the republic of Venice, called *the league of Cambray*, ratified in 1508. The Venetians having purchased peace by the cession of part of Romania, Julius turned his arms against Louis XII. king of France, and appeared in person armed cap-a-pee, at the siege of Mirandola; which place he took by assault in 1511. But proceeding to excommunicate Louis, the king wisely turned his own weapons against him, by calling a general council at Pisa: at which the pope refusing to appear, he was declared to be suspended from the holy see; and Louis, in his turn, excommunicated the pope, who died soon after in 1512. He built the famous church of St. Peter at Rome, and was a patron of the polite arts.

JULIUS VICUS, in ancient geography, a town of the Nemetes in Gallia Belgica: situated between the Tres Tabernæ and Noviomagus. Now *Germerheim*, a town of the Lower Palatinate, on the west side of the Rhine. E. lon. 8. 15. N. lat. 49. 12.

JULIUS POLLUX. See POLLUX.

JULPHA, OLD, once the capital of Armenia, in Asia, now in ruins, the inhabitants having been transplanted to a suburb of Ispahan, called New Julpha, where they have several churches. They were brought thither for the sake of trade.

IULUS, a son of Ascanius, born in Lavinium. In the succession to the kingdom of Alba, Æneas Sylvius, the son of Æneas and Lavinia, was preferred to him. He was, however, made chief priest.

IULUS, in zoology; a genus of insects of the order aptera. See pl. 25. The feet are very numerous, being on each side twice as many as the segments of the body; the antennæ are moniliform; there are two articulated palpi; and the body is of a semicylindrical form. 1. The terrestris is a small species, having on each side 100 very short closely-set feet. The body is cylindrically round, consisting of 50 segments, each of which gives rise to two pair of feet; by which means the feet stand two and two by the side of each other, so that between every two there is a little more space. Its colour is blackish, and the animal is very smooth. It is met with under stones, and in the earth. 2. The sabulosus is of an ashen-colour, smooth, and sometimes has two longitudinal bands of a dun-colour upon the back. The body is composed of about sixty segments, which appear double; one part of the segment being quite smooth, the other charged with longitudinal striæ very closely set together, which causes the cylindric body of the insect to appear intersected alternately with smooth and striated segments. Each segment gives rise to two pair of feet, which makes 240, or 120 feet on each side. These feet are slender, short, and white. The antennæ are very short, and consist of five rings. The insect, when touched, rolls itself up into a spiral; so that its feet are inwards, but yet turned towards the ground. It is found together with the preceding one, to which it bears a resemblance, though it is much larger. There are other species.

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JULY, the seventh month of the year; during which the sun enters the sign Leo. The word is derived from the Latin *Julius*, the surname of C. Cæsar the dictator, who was born in it. Mark Antony first gave this month the name *July*, which before was called *Quintilius*, as being the fifth month of the year in the old Roman calendar established by Romulus, which began in the month of March. For the same reason, August was called *Sextilis*; and September, October, November, and December, still retain the name of their first rank. "*Quæ sequitur, numero turba notata suo.*" OVID. Fast. On the 19th day of this month the dog-days are commonly supposed to begin; when, according to Hippocrates and Pliny, the sea boils, wine turns sour, dogs go mad, the bile is increased and irritated, and all animals decline and languish.

JULY-Flowers. See DIANTHUS.

JUMIEGE, a town of France, in the department of Lower Seine and late province of Normandy, with a late celebrated Benedictine abbey. It is seated on the river Seine, 12 miles S. W. of Rouen, and 77 N. W. of Paris. E. lon. 0. 55. N. lat. 49. 24.

JUMNA, a large river of Hindoostan Proper, which rises to the N. W. of Delhi, waters that capital, as well as the city of Agra, and joins the Ganges about 100 miles below Benares.

JUNCI LAPIDEI, in natural history, the name given by authors to a species of fossile coral, of the tubularia kind, and composed of a congeries of small tubules, which are usually round, and striated within. See Plate 31. Vol. III.

JUNCTURE, any joint or closing of two bodies. See JOINT. In oratory, *junction* denotes a part of composition, particularly recommended by Quintilian, and denotes such an attention to the nature of the vowels, consonants, and syllables, in the connection of words, with regard to their sound, as will render the pronunciation most easy and pleasant, and best promote the harmony of the sentence. Thus the coalition of two vowels, occasioning an hollow and obscure sound, and likewise of some consonants, rendering it harsh and rough, should be avoided: nor should the same syllable be repeated at the beginning and end of words, because the sound becomes thereby harsh and unpleasant. The following verse in Virgil's *Æneid* is an example of junction. "*Arma virumque cano, Trojæ qui primus ab oris.*"

JUNCUS, the RUSH, in botany; a genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 5th order, *Tripetaloidææ*. The calyx is hexaphyllous; there is no corolla; the capsule is unilocular. There are many species, which are universally known, being very troublesome weeds, and difficult to be eradicated. The pith of two kinds, called the *conglomeratus* and *effusus*, or round-headed and soft rushes, is used for wicks to lamps and rush-lights. The *conglomeratus*, and *aculus* or marine rush, are planted with great care on the banks of the sea in Holland in order to prevent the water from washing away the earth; which would otherwise be removed every tide, if it were not for the roots of those rushes, which fasten very deep in the ground, and mat themselves near the surface in such a manner as to hold the earth closely together. Therefore, whenever the inhabitants perceive that the roots of these rushes are destroyed, they are very assiduous in repairing them. In the summer-time when the rushes are fully grown, they are cut and tied up in bundles, which are dried, and afterwards carried into the larger towns and cities, where they are wrought into baskets, and several other useful things, which are frequently sent into England. These sorts do not grow so strong in this country as on the Maese, where they sometimes arrive at the height of four feet and upwards.

A species of rush termed *juncus odoratus*, "sweet rush, or

camel's hay," is sometimes brought to us from Turkey and Arabia, tied up in bundles about a foot long. The stalk, in shape and colour, somewhat resembles a barley-straw; it is full of fungous pith like that of our common rushes: the leaves are like those of wheat, and surround the stalk with several coats, as in the reed. The flowers are of a carnation colour, striped with a lighter purple. The whole plant, when in perfection, has a hot, bitterish, not unpleasing, aromatic taste, and a very fragrant smell: by long keeping it loses greatly its aromatic flavour. Distilled with water, it yields a considerable quantity of an essential oil. It was formerly often used in medicine as an aromatic, and in obstructions of the viscera, &c. but is very little employed at present.

JUNE, the sixth month of the year, during which the sun enters the sign of Cancer. The word comes from the Latin *Junius*, which some derive à *Junone*. Ovid, in the 6th of his *Fasts*, makes the goddess say, "*Junius à nostro nomine nomen habet.*" Others rather derive it à *junioribus*, this being for young people, as the month of May was for old ones. "*Junius est juvenum; qui fuit ante senum.*" In this month is the summer solstice.

JUNGERMANNIA, in botany; a genus of the natural order of algæ, belonging to the cryptogamia class of plants. The male flower is pedunculated, and naked; the anthera quadrivalved: the female flower is sessile, naked, with roundish seeds. There are 29 species, all natives of Britain, growing in woods, shady places, by the sides of ditches, &c. Many of them are beautiful objects for the microscope.

JUNGIA, in botany; a genus of the polygamia segregata order, belonging to the syngenesia class of plants: the common receptacle is chaffy; the perianthium three-flowered; the florets tubular, two-lipped; the exterior lip ligulate; the interior one bipartite.

JUNIPERUS, the JUNIPER-TREE; a genus of the monadelphia order, belonging to the monœcia class of plants; and in the natural method ranking under the 51st order, *Coniferae*. The male amentum is a calyx of scales; there is no corolla; three stamens: the female calyx tripartite; there are three petals; and as many styles; the berry is trispermous, and equal, by means of three tubercles of the indurated calyx adhering to it.

The *Species* are, 1. The *communis*, or common juniper, grows naturally in many parts of Britain upon dry barren commons, where it seldom rises above the height of a low shrub. Mr. Evelyn assures us, that "the juniper, though naturally of the growth of England, is very little known in many parts of the country: for it grows naturally only in dry, chalky, or sandy land; and, where the soil is opposite to this, the plant is rarely found. Those who have been used to see it in its wild state, on sandy barren commons, &c. will have little inducement to plant it; as there they will see it procumbent, seldom shewing a tendency to aspire: but when planted in a good soil, it will rise to the height of 15 or 16 feet, and produce numerous branches from the bottom to the top, forming a well-looking bushy plant. These branches are exceeding tough, and covered with a smooth bark of a reddish colour, having a tinge of purple. The leaves are narrow and sharp-pointed, growing by threes on the branches; their upper surface has a greyish streak down the middle; but their under surface is of a fine green colour, and they garnish the shrub in great plenty. The flowers are small, and of a yellowish colour. They are succeeded by the berries, which are of a blueish colour when ripe." Of this species there is a variety called *Swedish juniper*, which grows 10 or 12 feet high, very branchy the whole length, with the branches growing more erect, and leaves, flowers, and fruit, like the former. But Mr. Miller affirms the Swedish juniper to be a distinct species. A prostrate and very

dwarfish variety is mentioned by Mr. Lightfoot, under the name of *dwarf Alpine juniper*. It is frequently found in the mountains in the Highlands of Scotland, and has broader and thicker leaves than the former: the berries are also larger, or more oval than spherical. 2. The *oxycedrus*, or Spanish juniper, rises from 10 to 15 feet high, closely branched from bottom to top; having short, awl-shaped spreading leaves by threes, and small diœcious flowers, succeeded by large reddish-brown berries. 3. The *thurifera*, or blue-berried Spanish juniper, grows 20 feet high or more, branching in a conic form, with acute imbricated leaves growing by fours, and small diœcious flowers, succeeded by large blue flowers. 4. The *Virginiana*, or Virginia cedar, grows 30 or 40 feet high, branching from bottom to top in a conic manner, small leaves by threes adhering at their base; the younger ones imbricated, and the old ones spreading; with diœcious flowers, succeeded by small blue berries. 5. The *Lycia*, Lycian cedar, or olibanum tree, grows 20 feet high, branching erect; garnished with small obtuse oval leaves, every where imbricated; having diœcious flowers, succeeded by large oval brown berries. It is a native of Spain and Italy. 6. The *Phœnicia*, or Phœnician cedar, grows about 20 feet high, branching pyramidally; adorned with ternate and imbricated obtuse leaves; and diœcious flowers succeeded by small yellowish berries. It is a native of Portugal. 7. The *Bermudiana*, or Bermudian cedar, grows 20 or 30 feet high, has small acute leaves by threes below, the upper ones awl-shaped, acute, and decurrent, by pairs or fours, spreading outward, and diœcious flowers succeeded by purplish berries. It is a native of Bermudas. 8. The *Sabina*, or favin tree; of which there are the following varieties, viz. spreading, upright, and variegated favin. The first grows three or four feet high, with horizontal and very spreading branches; with short, pointed, decurrent, erect, opposite leaves; and diœcious flowers, succeeded by blueish berries, but very rarely producing either flowers or fruit. The second grows eight or ten feet high, with upright branches, dark-green leaves like the former, and diœcious flowers, succeeded by plenty of berries. The third has the ends of many of the shoots and young branches variegated with white, and the leaves finely striped; so that it makes a beautiful appearance. There are two other species; the *Barbadenfis*, with leaves all imbricated four ways, the younger ones ovate, the elder acute; and the *Chinensis*, with leaves decurrent imbricate-expanding crowded, the stem-leaves threefold, the branch-leaves fourfold.

The propagation of all the junipers is by seed, and of the favins by layers and cuttings; but these last may also be raised from the berries, if they can be procured. They may all be sowed in beds of common light earth; except the cedar of Bermudas, which must be sowed in pots, to have shelter in winter. When the hardy kinds have had two or three years growth in the seed-bed, they may be planted out in autumn or in spring, in nursery rows two feet asunder, there to remain till of due size for final transplantation into the shrubbery. The Bermudas cedar must be sheltered under a frame for the first year or two; when they must be separated into small pots, to be sheltered also in winter for three or four years, till they have acquired some size and strength; then turned out into pots in the full ground, where they are to remain in a warm situation; though a shelter of mats for the first winter or two during hard frosts will be of great service. The season for transplanting all the sorts is either in autumn, October, or November, or in March, and early in April.

Juniper-berries have a strong not disagreeable smell; and a warm, pungent, sweet taste; which, if they are long chewed, or previously well bruised, is followed by a bitterish one. The pungency seems to reside in the bark; the sweet in the juice; the aromatic flavour in oily vesicles spread through the sub-

stance of the pulp, and distinguishable even by the eye; and the bitter in the seeds. The fresh berries yield, on expression, a rich, sweet, honey-like aromatic juice; if previously pounded so as to break the seeds, the juice proves tart and bitter. From these berries a spirituous water and essential oil are prepared; and they are also ingredients in various medicines. The liquor remaining after the distillation of the oil, passed through a strainer, and gently exhaled to the consistence of a rob, was once reckoned a medicine of great utility, and in many cases preferable to the oil or the berry itself. Hoffman is expressly of this opinion, and recommends the rob of juniper in debility of the stomach and intestines; and says it is particularly serviceable to old people who are subject to these disorders, or labour under a difficulty with regard to the urinary secretion. This rob is of a dark brownish-yellow colour, a balsamic sweet taste, with a little of the bitter, more or less according as the seeds in the berry have been more or less bruised. But perhaps one of the best forms under which they can be used is that of a simple watery infusion. This, either by itself or with the addition of a small quantity of gin, is a very useful drink for hydropic patients. An infusion of the tops has also been advantageously employed in the same manner. The Swedes prepare an extract from the berries, probably of the nature of the rob above mentioned, which some eat for breakfast. In Germany the berries are bruised and put into the sauce made use of for a wild boar; and are frequently also eaten with other pork, to give it a wild-boar flavour. In Carniola and some other districts, the inhabitants make a kind of wine of them steeped in water; but it is difficult to prevent this liquor from growing sour. The Laplanders, as we are told by Linnæus, drink infusions of the juniper-berries as we do tea and coffee. Thrushes and grouse feed on the berries, and disseminate the seed in their dung. It is remarkable that the berries of the juniper are two years in ripening. They sometimes appear in an uncommon form; the leaves of the cup grow double the usual size, approaching, but not closing; and the three petals fit exactly close, so as to keep the air from the *tipula juniperi* which inhabit them. The whole plant has a strong aromatic smell. The wood when burnt emits a fragrant odour like incense. It is of a reddish-colour, very hard and durable; and, when large enough, is used in marquetry and veneering, and in making cups, cabinets, &c. Grass will not grow beneath juniper, but this tree itself is said to be destroyed by the meadow-oat. The oil of juniper resembles that of turpentine, and when mixed with nut-oil makes an excellent varnish for pictures or wood-work, and for preserving iron from rust. The resin powdered and rubbed into paper prevents the ink from sinking through it, for which it is frequently used under the name of Pounce.—The charcoal made from this wood is said to endure longer than any other. For the properties of some other species, see the articles SANDARACH (*Gum*), and OLIBANUM.

JUNIUS (ADRIAN), one of the most learned men of the age in which he lived, was born at Horn in Holland in 1511. He travelled into all parts of Europe, and practised physic with reputation in England; where, among other works, he composed a Greek and Latin Lexicon, to which he added above 6520 words; an *Epithalamium* on the marriage of queen Mary with king Philip of Spain; and *Animadversa & de Coma Commentarius*, which is the most applauded of all his works. He died in 1575.

JUNIUS (Francis), professor of divinity at Leyden, was born at Bourges in 1545, of a noble family, and studied some time at Lyons. Bartholomew Aneau, who was principal of the college in that city, gave him excellent instructions with regard to the right method of studying. He was remarkable for being proof against all temptations to lewdness;

but a libertine so far overpowered him by his sophistry, that he made him an atheist: however, he soon returned to his first faith; and, averse as he was to unlawful love, he had no aversion to matrimony, but was married no less than four times. He was employed in public affairs by Henry IV.; and at last was invited to Leyden to be professor of divinity, which employment he discharged with honour, till he was snatched away by the plague in 1602. Du Pin says, he was a learned and judicious critic. He wrote, in conjunction with Emmanuel Tremellius, a Latin version of the Hebrew text of the Bible. He also published Commentaries on a great part of the Holy Scriptures; and many other works, all in Latin.

JUNIUS (Francis), or *Francis du Jon*, the son of the preceding, was born at Heidelberg in 1589. He at first designed to devote himself to a military life; but after the truce concluded in 1609, he applied himself entirely to study. He came to England in 1620, and lived 30 years in the earl of Arundel's family. He was greatly esteemed not only for his profound erudition, but also for the purity of his manners; and was so passionately fond of the study of the northern languages, that, being informed there were some villages in Friesland where the ancient language of the Saxons was preserved, he went and lived two years in that country. He returned to England in 1675; and, after spending a year at Oxford, retired to Windsor, in order to visit Vossius, at whose house he died in 1677. The university of Oxford, to which he bequeathed his manuscripts, erected a very handsome monument to his memory. He wrote, 1. *De Pictura Veterum*, which is admired by all the learned; the best edition of it is that of Rotterdam in 1694. He published the same work at London in English. 2. An explication of the old Gothic manuscript, called the *Silver* one, because the four Gospels are there written in silver Gothic letters: this was published with notes by Thomas Mareschal, or Marshal. 3. A large Commentary on the Harmony of the four Gospels by Tatian, which is still in manuscript. 4. A Glossary in five languages, in which he explains the origin of the Northern languages; published at Oxford in 1745, in folio, by Mr. Edward Lee.

JUNIUS, the fictitious name of an unknown but highly eminent writer on political topics in England. His celebrated letters, which appeared in 1769, form a single volume, and have been universally read. They are not less distinguished for able remark, keen invective, and polished satire, than for their extraordinary beauties of composition. He was opposed by our noted Lexicographer Dr. Samuel Johnson, who, nevertheless, quotes Junius repeatedly in his Dictionary of the English Language, and considered him a strictly classical writer.

JUNK, in sea-language, a name given to any remnants or pieces of old cable, which is usually cut into small portions, for the purpose of making points, mats, gaskets, fennit, &c.

JUNO, in pagan worship, was the sister and wife of Jupiter, and the goddess of kingdoms and riches; also styled the *queen of Heaven*: she presided over marriage and child-birth, and was represented as the daughter of Saturn and Rhea. She married Jupiter; but was not the most compliant wife: for, according to Homer, that god was sometimes obliged to make use of all his authority to keep her in due subjection; and the same author observes, that on her entering into a conspiracy against him, he punished her by suspending her in the air with two anvils fastened to her feet, and golden manacles on her hands, whilst all the other deities looked on without a possibility of helping her. However, her jealousy made her frequently find opportunities of interrupting her husband in the course of his amours; and prompted her to punish with unrelenting fury Europa, Semele, Io, Latona, and the rest of his mistresses. Jupiter himself having conceived without any commerce with a female; Juno, in revenge, conceived Vul-

can by the wind, Mars by touching a flower pointed out to her by the goddesses Flora, and Hebe by eating greedily of lettuces.

Juno, as the queen of Heaven, preserved great state: her usual attendants were Terror and Boldness, Castor, Pollux, and 14 nymphs; but her most faithful attendant was the beautiful Iris, or the rainbow. Homer describes her in a chariot adorned with precious stones, the wheels of which were of ebony, and which was drawn by horses with reins of gold. But she is more commonly painted drawn by peacocks. She was represented, in her temple at Corinth, seated on a throne, with a crown on her head, a pomegranate in one hand, and in the other a sceptre with a cuckoo on its top. This statue was of gold and ivory.

Some mythologists suppose that Juno signifies the air: others, that she was the Egyptian Isis; who being represented under various figures, was by the Greeks and Romans described as so many distinct deities.

JUNONALIA, a festival observed by the Romans in honour of Juno. It was instituted on account of certain prodigies that happened in Italy, and was celebrated by matrons. In the solemnity two white cows were led from the temple of Apollo into the city through the gate called *Carmentalis*, and two images of Juno, made of cypress, were borne in procession. Then marched 27 girls, habited in long robes, singing an hymn to the goddess; then came the Decemviri, crowned with laurel, in vestments edged with purple. This pompous company, going through the *Vicus Jugarius*, had a dance in the great field of Rome; from thence they proceeded through the *Forum Boarium* to the temple of Juno, where the victims were sacrificed by the Decemviri, and the cypress images were left standing. This festival is not mentioned in the *Fasts* of Ovid, but is fully described by Livy, lib. 7. dec. 3. The hymn used upon the occasion was composed by Livius the poet.

JUNSALAM, a seaport of Asia, in the kingdom of Siam. It is a shelter for all the ships that are bound to the coast of Coromandel, when they are surprised by a storm. It is seated to the N. of a large island of the same name. E. lon. 98. 30. N. lat. 8. 56.

JUNTO, in matters of government, denotes a select council for taking cognizance of affairs of great consequence, which require secrecy. In Spain and Portugal it signifies much the same with convention, assembly, or board among us: thus we meet with the junto of the three estates, of commerce, of tobacco, &c. See **BOARD**, &c.

IVORY, in natural history, &c. a hard, solid, and firm substance, of a white colour, and capable of a very good polish. It is the tusk of the elephant (See **ELEPHAS**), and is hollow from the base to a certain height, the cavity being filled up with a compact medullary substance, seeming to have a great number of glands in it. It is observed, that the Ceylon ivory, and that of the island of Achem, do not become yellow in the wearing, as all other ivory does: for this reason the teeth of these places bear a larger price than those of the coast of Guinea.

Hardening, Softening, and Staining of IVORY. See **BONES** and **HORNS**.

JUPITER, the supreme god of the ancient pagans. The theologists, according to Cicero, reckoned up three Jupiters; the first and second of whom were born in Arcadia; of these two, the one sprang from Æther, the other from Cœlus. The third Jupiter was the son of Saturn, and born in Crete, where they pretended to shew his sepulchre. Cicero in other places speaks of several Jupiters who reigned in different countries. The Jupiter, by whom the poets and divines understand the supreme God, was the son of Saturn king of Crete. He

would have been devoured by his father as soon as born, had not his mother Rhea substituted a stone instead of the child, which Saturn immediately swallowed. Saturn took this method to destroy all his male children, because it had been foretold by Cœlus and Terra, that one of his sons should deprive him of his kingdom. Jupiter, being thus saved from his father's jaws, was brought up by the Curetes in a den on mount Ida. Virgil tells us, that he was fed by the bees; out of gratitude for which he changed them from an iron to a golden colour. Some say, that his nurses were Amalthæa and Melissa, who gave him goats-milk and honey; and others, that Amalthæa was the name of the goat which nourished him; and which, as a reward for her great services, was changed into a constellation. According to others, he was fed by wild pigeons, who brought him ambrosia from Oceanus; and by an eagle, who carried nectar in his beak from a steep rock: for which he rewarded the former, by making them the foretellers of winter and summer; and the last by giving him immortality, and making him his thunder-bearer. When grown up, he drove his father out of heaven, and divided the empire of the world with his brothers. For himself, he had heaven and earth. Neptune had the sea and waters; and Pluto hell. The Titans undertook to destroy Jupiter, as he had done his father. These Titans were giants, the sons of Titan and the Earth. They declared war against Jupiter, and heaped mountains upon mountains, in order to scale heaven: but their efforts were unsuccessful. Jupiter overthrew them with his thunder, and shut them up under the waters and mountains, from which they were not able to get out.

Jupiter had several wives: the first of whom, named *Metis*, he is said to have devoured when big with child, by which he himself became pregnant: and Minerva issued out of his head, completely armed and fully grown. His second was Themis; the name of his third is not known; his fourth was the celebrated Juno, whom he deceived under the form of a cuckoo, which to shun the violence of a storm fled for shelter to her lap. He was the father of the Muses and Graces; and had a prodigious number of children by his mistresses. He metamorphosed himself into a satyr to enjoy Antiope; into a bull, to carry off Europa; into a swan, to abuse Leda; into a shower of gold, to corrupt Danaë; and into several other forms to gratify his passions. He had Bacchus by Semele, Diana and Apollo by Latona, and was the father of Mercury and the other gods.

The heathens in general believed that there was but one supreme God: but when they considered this one great being as influencing the affairs of the world, they gave him as many different names; and hence proceeded their variety of nominal gods. When he thundered or lightened, they called him *Jupiter*; when he calmed the sea, *Neptune*; when he guided their councils, *Minerva*; and when he gave them strength in battle, *Mars*. In process of time they used different representations of this Jupiter, &c. and considered them, vulgarly at least, as so many different persons. They afterward regarded each of them in different views: *e. g.* The Jupiter that showered down blessings was called the *Kind Jupiter*; and when punishing, the *Terrible Jupiter*. There was also one Jupiter for Europe, and another for Africa; and in Europe, there was one great Jupiter who was the particular friend of the Athenians, and another who was the special protector of the Romans: nay, there was scarce a town or hamlet perhaps in Italy, that had not a Jupiter of its own; and the Jupiter of Terracina, or Jupiter Anxur, represented in medals as young and beardless, with rays round his head, more resembled Apollo than the great Jupiter at the Capitol. In this way Jupiter at length had temples and different characters almost every where: at Carthage, he was called *Ammon*; in Egypt, *Serapis*; at Athens,

the great Jupiter was the Olympian Jupiter; and at Rome the greatest Jupiter was the Capitoline Jupiter, who was the guardian and benefactor of the Romans, and whom they called the best and greatest Jupiter; *Jupiter optimus maximus*. The figure of this Jupiter was represented in his chief temple on the Capitoline hill, as sitting on a curule chair, with the fulmen or thunder, or rather lightning, in one hand, and a sceptre in the other. This fulmen in the figures of the old artists was always adapted to the character under which they were to represent Jupiter. If his appearance was to be mild and calm, they gave him the conic fulmen, or bundle of flames wreathed close together, held down in his hand. When punishing, he holds up the same figure, with two transverse darts of lightning, sometimes with wings added to each side of it, to denote its swiftness; this was called by the poets the three-forked bolt of Jove: and when he was going to do some exemplary execution, they put in his hand a handful of flames, all let loose in their utmost fury; and sometimes filled both his hands with flames. The superiority of Jupiter was principally manifested in that air of majesty which the ancient artists endeavoured to express in his countenance: particular attention was paid to the head of hair, the eye-brows, and the beard. There are several heads of the mild Jupiter on ancient seals; where his face has a mixture of dignity and ease in it, admirably described by Virgil, *Æn.* i. v. 256. The statues of the terrible Jupiter were generally of black marble, as those of the former were of white: the one sitting with an air of tranquillity; the other standing, more or less disturbed. The face of the one is pacific and serene; of the other angry or clouded. On the heads of the one the hair is regular and composed; in the other it is so discomposed, that it falls half-way down the forehead. The face of the Jupiter Tonans resembles that of the Terrible Jupiter; he is represented on gems and medals as holding up the triple bolt in his right hand, and standing in a chariot, which seems to be whirled on impetuously by four horses. Thus he is also described by the poets. Ovid. *Deian.* Herc. v. 28. Horace, lib. i. od. 4. v. 8. Jupiter, as the intelligence presiding over a single planet, is represented only in a chariot and pair: on all other occasions, if represented in a chariot, he is always drawn by four horses. Jupiter is well known as the chief ruler of the air, whose particular province was to direct the rains, the thunders and the lightnings. As the dispenser of rain, he was called *Jupiter Pluvius*: under which character he is exhibited seated in the clouds, holding up his right hand, or extending his arms almost in a straight line each way, and pouring a stream of hail and rain from his right hand upon the earth; whilst the fulmen is held down in his left. The wings that are given him relate to his character of presiding over the air: his hair and beard in the Antonine pillar are all spread down by the rain, which descends in a sheet from him, and falls for the refreshment of the Romans; whilst their enemies are represented as struck with the lightnings, and lying dead at their feet.

Some consider a great part of the fable of Jupiter to include the history of Noah and his three sons; and that Saturn is Noah, who saw all mankind perish in the waters of the deluge; and who, in some sort, swallowed them up, by not receiving them into the ark. Jupiter is Ham; Neptune, Japheth; and Shem, Pluto.

The Titans, it is thought, represent the old giants, who built the tower of Babel, and whose pride and presumption God had confounded, by changing their language, and pouring out the spirit of discord and division among them. The name of *Jupiter*, or *Jovis Pater*, is thought to be derived from Jehovah, pronounced with the Latin termination *Jovis* instead of *Jova*; and in medals we meet with *Jovis* in the nominative as well as oblique cases: for example *Jovis Custis*, *Jo is Propugnator*, *Jovis Sator*. To the name *Jovis* was added *pater*; and afterwards

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wards instead of "*Jovis pater*," *Jupiter* was used by abbreviation.

The name *Jupiter* was not known to the Hebrews till the reign of Alexander the Great, and the kings his successors. Antiochus Epiphanes commanded the idol of Jupiter Olympius to be placed in the temple at Jerusalem; and that of Jupiter the Defender of Strangers in the temple on mount Gerizim. 2 Macc. vi. 2. While St. Paul and St. Barnabas were at Jystra, they were taken for gods, because they cured one who had been lame from his birth, and that by an expression only: St. Paul was taken for Mercury, by reason of his eloquence; and St. Barnabas for Jupiter (Acts xiv. 11, 12.), on account probably of his good mien.

JUPITER, *U*, in astronomy, one of the superior planets, remarkable for its brightness; and which by its proper motion seems to revolve round the earth in about twelve years. See ASTRONOMY.

JURA, one of the Western Isles of Scotland, to the N. E. of the island of May, on the coast of Argyleshire. It is 10 miles long, and seven broad. Some parts of the southern and western sides are fertile. There are only three mountains on the whole island. These are of a conic form, of a stupendous height, and are called the Paps of Jura. The rest of the island is flat, and generally covered with heath. A few wild roes are still seen here.

JURA, a department of France, including part of the late province of Franche Comté. It contains mines of iron of a superior quality, mines of copper and lead, and many quarries of black marble, of jasper of different colours, and of alabaster. It takes its name from Mount Jura.

JURA is also the name of a chain of mountains in Switzerland, beginning in the canton of Zurich, extending from thence along the Rhine into the canton and bishopric of Basle, stretching into the canton of Soleure and the principality of Neuchâtel, and branching out towards the Pays de Vaud; separating that county from Franche Comté and Burgundy, and continued beyond the Genevan territories as far as the Rhone. Many elevated valleys are formed by different parts of this chain in the country of the Pays de Vaud; among which one of the most remarkable is the valley of the lake of Joux, on the top of that part of the chain named Mount Joux. It contains several populous villages, and is beautifully diversified with wood, arable land, and pasture. It is watered by two lakes; the largest of which is that of Joux already mentioned. This has one shore of a high rock covered with wood; the opposite banks forming a gentle ascent, fertile and well cultivated; behind which is a ridge covered with pines, beech and oak wood. The smaller lake, named *Brenet*, is bordered with fine corn-fields and villages; and the stream which issues from it is lost in a gulf named *Entonnoir*, or *thé Funnel*, where the people have placed several mills, which are turned by the force of the falling current. The river Orbe issues from the other side of the mountain, about two miles from this place; and probably owes its origin to the subterraneous stream just mentioned. The largest lake is supplied by a rivulet which issues from the bottom of a rock, and loses itself in it. The valley contains about 3000 inhabitants, remarkable for their industry. Some are watch-makers; but the greatest number employ themselves in polishing crystals, granites, and marcasites. The country is much infested with bears and wolves. In ascending to this place there is a very extensive prospect of great part of the Pays de Vaud, the lake of Geneva, and that of Neuchâtel, which from that high point of view appear to be nearly on a level; though M. de Luc found the latter to be 159 feet above the level of the lake of Geneva.

JURATS, JURATI, magistrates in the nature of ALDERMEN, for the government of several corporations. Thus we meet with

the mayor and jurats of Maidstone, Rye, Winchelsea, &c.—So also Jersey has a bailiff and twelve jurats, or sworn assistants, to govern the island.

IVREA, an ancient and strong town of Italy, in Piedmont, and capital of Canavez, with a strong fort, a bishop's see, and an ancient castle. It is seated on the river Doria, between two hills, 20 miles N. of Turin, and 32 E. by N. of Susa. E. lon. 7. 48. N. lat. 45. 22.

JURIFU (PETER), an eminent French Protestant divine, called ironically by the papists the *Goliath* of the Protestants, was born in 1637. He was educated in England under his maternal uncle Peter du Moulin, and took orders in the English church; but returning to succeed his father as pastor of a reformed congregation at Mer in the diocese of Blois, he was made professor of divinity and Hebrew at Sedan, where he acquired great reputation. This university being taken from the Protestants, a professorship of divinity was founded for him at Rotterdam; and he was also appointed minister of the Walloon church in the same town. Being now in a place of liberty, he gave full scope to an imagination naturally warm, and applied himself to study the book of Revelation, of which he fancied he had by a kind of inspiration discovered the true meaning; a notion that led him to many enthusiastical conjectures. He was moreover so unfortunate as to quarrel with his best friends for opposing his visionary opinions, which produced violent disputes between him and Messrs. Bayle and de Beauval. He died in 1713; and left a great number of esteemed works behind him.

JURIN (Dr. JAMES), a distinguished person, who cultivated medicine and mathematics with equal success. He was secretary of the Royal Society in London, as well as president of the College of Physicians there. He had great disputes with Michellotti upon the momentum of running waters, with Robins upon distinct vision, and with the partisans of Leibnitz upon moving bodies. A treatise of his "upon Vision" is printed in Smith's "Optics." He died in 1750.

JURISCONSULTUS, *Iuris*, among the Romans, was a person learned in the law; a master of the Roman jurisprudence, who was consulted on the interpretation of the laws and customs, and on the difficult points in law-suits. The fifteen books of the Digests were compiled wholly from the answers or reports of the ancient juriconsulti. Trebonianus, in destroying the 2000 volumes from whence the Code and Digest were taken, has deprived the public of a world of things which would have given them light into the ancient office of the juriconsulti. We should scarce have known any thing beyond their bare names, had not Pomponius, who lived in the second century, taken care to preserve some circumstances of their office.

The Roman juriconsulti seem to have been the same with our chamber counsellors, who arrived at the honour of being consulted through age and experience, but never pleaded at the bar. Their pleading advocates or lawyers never became juriconsulti. See ADVOCATE. In the times of the commonwealth, the advocati had by much the more honourable employment, as being in the ready way to attain the highest preferments. They then despised the juriconsulti, calling them in derision *formularii* and *leguleii*, as having invented certain forms and monosyllables, in order to give their answers the greater appearance of gravity and mystery. But in process of time they became so much esteemed that they were called *prudentes* and *sapientes*, and the emperors appointed the judges to follow their advice. Augustus advanced them to be public officers of the empire; so that they were no longer confined to the petty counsels of private persons.—Bern. Rutilius has written the lives of the most famous juriconsulti who have lived within these 2000 years.

JURISDICTION, a power or authority which a man has to do justice in cases of complaint made before him. There are

two kinds of jurisdiction; the one *ecclesiastical*, the other *secular*.

Secular JURISDICTION belongs to the king and his justices or delegates. The courts and judges at Westminster have jurisdiction all over England, and are not restrained to any county or place; but all other courts are confined to their particular jurisdictions, which if they exceed, whatever they do is erroneous. There are three sorts of inferior jurisdictions: the first is *tenere placita*, to hold pleas, and the plaintiff may sue either there or in the king's courts. Another is the conu- sance of pleas, where a right is invested in the lord of the franchise to hold pleas: and he is the only person that can take advantage of it, by claiming his franchise. The third sort is an exempt jurisdiction, as where the king grants to some city, that the inhabitants shall be sued within their city and not elsewhere; though there is no jurisdiction that can withstand a *certiorari* to the superior courts.

Ecclesiastical JURISDICTION belongs to bishops and their deputies. Bishops, &c. have two kinds of jurisdiction; the one *internal*, which is exercised over the conscience in things purely spiritual; and this they are supposed to hold immediately of God. The other is *contentious*, which is a privilege some princes have given them in terminating disputes between ecclesiastics and laymen.

JURISPRUDENCE, the science of what is just or unjust; or the knowledge of laws, rights, customs, statutes, &c. necessary for the administration of justice. See Law.

JUROR, JURATOR, in a legal sense, is one of those twenty-four or twelve men who are sworn to deliver truth upon such evidence as shall be given them touching any matter in question. The punishment of petty jurors attainted of giving a verdict contrary to evidence, willingly, is very severe.

IVRY, a town of France, in the department of Eure and late province of Normandy, with a late Benedictine abbey. It is seated on the river Eure, 10 miles N. by W. of Dreux. E. lon. 1. 28. N. lat. 48. 54.

JURY, a certain number of men sworn to inquire into and try a matter of fact, and to declare the truth upon such evidence as shall appear before them. Juries are, in these kingdoms, the supreme judges in all courts and in all causes in which either the life, property, or reputation, of any man is concerned: this is the distinguishing privilege of every Briton, and one of the most glorious advantages of our constitution; for, as every one is tried by his peers, the meanest subject is as safe and as free as the greatest. See the article TRIAL.

JURY-Mast, whatever is set up in room of a mast that has been lost in a storm or an engagement, and to which a lesser yard, ropes, and sails, are affixed.

JUS CORONÆ. See HEREDITARY Right, and SUCCESSION.

Jus Civile, among the Romans, signified no more than the interpretation given by the learned, of the laws of the twelve tables, though the phrase now extends to the whole system of the Roman laws.

Jus Civitatis signifies freedom of the city of Rome, which entitled those persons who had obtained it to most of the privileges of Roman citizens—yet it differs from *Jus Quiritium*, which extended to all the advantages which a free native of Rome was entitled to—the difference is much the same as betwixt *denization* and *naturalization* with us.

Jus Honorarium was a name given to those Roman laws which were made up of edicts of the supreme magistrates, particularly the *prætors*.

Jus Imaginis, was the right of using pictures and statues amongst the Romans, and had some resemblance to the right of bearing a coat of arms amongst us. This honour was allowed to none but those whose ancestors or themselves had

borne some *curule office*, that is, had been *Curule Aedile*, *Censor*, *Prætor*, or *Consul*. The use of statues, &c. which the *Jus Imaginis* gave, was the exhibiting them in funeral processions, &c. See *IMAGE*.

Jus Papirianum, was the laws of Romulus, Numa, and other kings of Rome, collected into a body by Sextus Papirius, who lived in the time of Tarquin the Proud; which accounts for the name.

Jus Trium Liberorum was a privilege granted to such persons in the city of Rome as had three children, by which they were exempted from all troublesome offices. The same exemption was granted to any persons who lived in other parts of Italy, having four children; and those that lived in the provinces, provided they had five (or as some say seven) children, were entitled to the same immunities. This was good policy, and tended to the population of the empire. See *CHILDREN*.

JUSSICA, in botany; a genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The calyx is quadripartite or quinquepartite superior; there are four or five petals; the capsule quadrilocular or quinquelocular, oblong, opening at the angles: the seeds are numerous and small.

JUST, a sportive kind of combat on horseback, man against man, armed with lances. The word is by some derived from the French *jouste*, of the Latin *juxta*, because the combatants fought near one another. Salmasius derives it from the modern Greek *zoustra*, or rather *ζουστρα*, which is used in this sense by Nicephorus Gregorius. Others derive it from *juxta*, which in the corrupt age of the Latin tongue was used for this exercise, by reason it was supposed a more just and equal combat than the tournament.

The difference between justs and tournaments consists in this, that the latter is the genus, of which the former is only a species. Tournaments included all kinds of military sports and engagements made out of gallantry and diversion: justs were those particular combats where the parties were near each other, and engaged with lance and sword. Add, that the tournament was frequently performed by a number of cavaliers, who fought in a body: the just was a single combat of one man against another. Though the justs were usually made in tournaments after a general rencounter of all the cavaliers, yet they were sometimes singly, and independent of any tournament. See *TOURNAMENT*. He who appeared for the first time at a just, forfeited his helm or casque unless he had forfeited before at a tournament.

JUSTEL (*CHRISTOPHER*), a learned counsellor, and secretary to the French king, was born at Paris in 1580, and applied himself to the study of ecclesiastical history. He maintained a correspondence with the most learned men of his time, as Archbishop Usher, Sir Henry Spelman, Blondel, &c. till his death, which happened in 1649. He wrote, 1. The code of the canons of the church universal, and the councils of Africa, with notes. 2. A genealogical history of the house of Auvergne. And, 3. Collections of Greek and Latin canons, from several manuscripts, which formed the *Bibliotheca juris canonici veteris*, published in 2 vols. folio, by William Voet and our author's son.

JUSTEL (*Henry*), son of the foregoing, was born at Paris in 1620. He became secretary and counsellor to the king; and was as distinguished for his own learning as remarkable for encouraging it in others. He came to London in 1681, on the persecution of the Protestants; and was made keeper of the royal library at St. James's; which office he held till his death in 1693, when he was succeeded by the famous Dr. Bentley.

He wrote several books, the titles of which may be seen in the catalogue of the Bodleian library.

JUSTICE, in a moral sense, is one of the four cardinal virtues, which gives every person his due. Civilians distinguish justice into two kinds; *communicative* and *distributive*. The former establishes fair dealing in the mutual commerce between man and man; and includes sincerity in our discourse, and integrity in our dealings. The effect of sincerity is mutual confidence, so necessary among the members of the same community; and this mutual confidence is sustained and preserved by the integrity of our conduct.

Distributive justice is that by which the differences of mankind are decided, according to the rules of equity. The former is the justice of private individuals; the latter of princes and magistrates.

Fidelity and truth are the foundation of justice. As to be perfectly just is an attribute of the Divine Nature, to be so to the utmost of our ability is the glory of man. History abounds with various examples, of which we shall mention only the following. Among the several virtues of Aristides, that for which he was most renowned was justice; because this virtue is of most general use, its benefits extending to a greater number of persons, as it is the foundation, and in a manner the soul, of every public office and employment. Hence it was that Aristides, though in low circumstances, and of mean extraction, obtained the glorious surname of the *Just*; a title, says Plutarch, truly royal, or rather truly divine: but of which princes are seldom ambitious, because generally ignorant of its beauty and excellence. They choose rather to be called the conquerors of cities and the thunderbolts of war, preferring the vain honour of pompous titles, which convey no other idea than violence and slaughter, to the solid glory of those expressive of goodness and virtue. How much Aristides deserved the title given him, will appear in the following instance; though it ought to be observed, that he acquired it not by one or two particular actions, but by the whole tenor of his conduct.

Themistocles having conceived the design of supplanting the Lacedæmonians, and of taking the government of Greece out of their hands, in order to put it into those of the Athenians, kept his eye and his thoughts continually fixed upon that great project; and as he was not very nice or scrupulous in the choice of his measures, whatever tended towards the accomplishing of the end he had in view he looked upon as just and lawful.

On a certain day then he declared in a full assembly of the people, that he had a very important design to propose; but that he could not communicate it to the people, because its success required it should be carried on with the greatest secrecy: he therefore desired they would appoint a person to whom he might explain himself upon the matter in question. Aristides was unanimously fixed upon by the whole assembly, who referred themselves entirely to his opinion of the affair; so great a confidence had they both in his probity and prudence. Themistocles, therefore, having taken him aside, told him that the design he had conceived was to burn the fleet belonging to the rest of the Grecian states, which then lay in a neighbouring port; and by this means Athens would certainly become mistress of all Greece. Aristides hereupon returned to the assembly, and only declared to them, that indeed nothing could be more advantageous to the commonwealth than Themistocles's project, but that at the same time nothing in the world could be more unjust. All the people unanimously ordained that Themistocles should entirely desist from his project.

There is not perhaps in all history a fact more worthy of

admiration than this. It is not a company of philosophers (to whom it costs nothing to establish fine maxims and sublime notions of morality in the school) who determine on this occasion that the consideration of profit and advantage ought never to prevail in preference to what is honest and just; but the whole people, who are highly interested in the proposal made to them, that are convinced it is of the greatest importance to the welfare of the state, and who, however, reject it with unanimous consent, and without a moment's hesitation; and for this only reason, that it is contrary to justice. How black and perfidious, on the other hand, was the design which Themistocles proposed to them, of burning the fleet of their Grecian confederates at a time of entire peace, solely to aggrandize the power of the Athenians! Had he an hundred times the merit ascribed to him, this single action would be sufficient to fully all his glory; for it is the heart, that is to say, integrity and probity, which constitutes and distinguishes true merit.

JUSTICE is also an appellation given to a person deputed by the king to administer justice to his subjects, whose authority arises from his deputation, and not by right of magistracy. Of these justices there are various kinds in England; viz.

Chief Justice of the King's Bench is the capital justice of Great Britain, and is a lord by his office. His business is chiefly to hear and determine all pleas of the crown; that is, such as concern offences against the crown, dignity, and peace of the king; as treasons, felonies, &c. This officer was formerly not only chief justice, but also chief baron for the exchequer, and master of the court of wards. He usually sat in the king's palace, and there executed that office formerly performed *per comitem palatii*; he determined in that place all the differences happening between the barons and other great men. He had the prerogative of being the vicegerent of the kingdom whenever the king went beyond sea, and was usually chosen to that office out of the prime nobility; but his power was reduced by king Richard I. and king Edward I. His office is now divided, and his title changed from *capitalis Angliæ justitarius*, to *capitalis justitarius ad placita coram rege tenenda*, or *capitalis justitarius banci regii*.

Chief Justice of the Common Pleas, he who with his assistants hears and determines all causes at the common law; that is to say, all civil causes between common persons, as well personal as real; and he is also a lord by his office.

Justice of the Forest, is a lord by his office, who has power and authority to determine offences committed in the king's forests, &c. which are not to be determined by any other court of justice. Of these there are two; whereof one has jurisdiction over all the forests on this side Trent, and the other beyond it.

By many ancient records, it appears to be a place of great honour and authority, and is never bestowed but on some person of great distinction. The court where this justice sits is called the *justice-seat of the forest*, held once every three years, for hearing and determining all trespasses within the forest, and all claims of franchises, liberties and privileges, and all pleas and causes whatsoever therein arising. This court may fine and imprison for offences within the forest, it being a court of record; and therefore a writ of error lies from hence to the court of king's bench. The last court of justice-seat of any note was that held in the reign of Charles I. before the earl of Holland. After the restoration another was held for form sake before the earl of Oxford; but since the revolution in 1688, the forest laws have fallen into total disuse, to the great advantage of the subject. This is the only justice who may appoint a deputy: he is also called *justice in eyre of the forest*.

JUSTICES of *Affise* were such as were wont by special commission to be sent into this or that county to take assises, for the ease of the subjects. For, whereas these actions pass always by jury, so many men might not without great damage and charge be brought up to London; and therefore justices, for this purpose, by commissions particularly authorized, were sent down to them. These continue to pass the circuit by two and two twice every year through all England, except the four northern counties, where they go only once, dispatching their several businesses by several commissions; for they have one commission to take assises, another to deliver gaols, and another of oyer and terminer. In London and Middlesex a court of general gaol-delivery is held eight times in the year. All the justices of peace of any county wherein the assises are held, are bound by law to attend them, or else are liable to a fine; in order to return recognizances, &c. and to assist the judges in such matters as lie within their knowledge and jurisdiction, and in which some of them have been probably concerned by way of previous examination. See ASSISES and JURY.

JUSTICES in *Eyre* (*justitiarum itinerantes*, or *errantes*), were those who were anciently sent with commission into divers counties to hear such causes especially as were termed *pleas of the crown*; and that for the ease of the subject, who must else have been hurried to the courts of Westminster, if the cause were too high for the county-courts. According to some, these justices were sent once in seven years; but others will have them to have been sent oftener. Camden says, they were instituted in the reign of king Henry II. A. D. 1184; but they appear to be of an older date. They were somewhat like our justices of assise at this day; though for authority and manner of proceeding very different.

JUSTICES of *Gaol Delivery*, those commissioned to hear and determine causes appertaining to such as for any offence are cast into prison. Justices of gaol-delivery are empowered by the common law to proceed upon indictments of felony, trespass, &c. and to order execution or reprieve; and they have power to discharge such prisoners as upon their trials shall be acquitted; also all such against whom, on proclamation made, no evidence appears to indict; which justices of oyer and terminer, &c. may not do. 2 Hawk. 24, 25. But these justices have nothing to do with any person not in the custody of the prison, except in some special cases: as, if some of the accomplices to a felony may be in such prison and some of them out of it, the justices may receive an appeal against those who are out of the prison as well as those who are in it; which appeal, after the trial of such prisoners, shall be removed into B. R. and process issue from them against the rest. But if those out of prison be omitted in the appeal, they can never be put into any other; because there can be but one appeal for one felony. In this way the gaols are cleared, and all offenders tried, punished, or delivered, in every year. Their commission is now turned over to the justices of assise.

JUSTICES of *Nisi Prius* are now the same with *justices of assise*. It is a common adjournment of a cause in the Common Pleas to put it off to such a day, *Nisi prius justitiarum venerint ad eas partes ad capiendas assisas*: from which clause of adjournment they are called *justices of nisi prius*, as well as *justices of assise*; on account of the writ and actions they have to deal in.

JUSTICES of *Oyer and Terminer*, were justices deputed on some special occasions to hear and determine particular causes. The commission of oyer and terminer is directed to certain persons, upon any insurrection, heinous demeanour, or trespass committed, who must first inquire, by means of the grand jury or inquest, before they are empowered to hear and determine by the help of the petit jury. It was formerly held, that no judge

or other lawyer could act in the commission of oyer and terminer, or in that of gaol-delivery, within the county where he was born or inhabited: but it was thought proper by 12 Geo. II. cap. 27. to allow any man to be a justice of oyer and terminer and general gaol-delivery within any county of England.

JUSTICES of the Peace are persons of property and credit, appointed by the king's commission to keep the peace of the county where they live. Of these some for special respect are made of the quorum, so as no business of importance may be dispatched without the presence or assent of them or one of them. However, every justice of peace hath a separate power, and his office is to call before him, examine, issue warrants for apprehending, and commit to prison, all thieves, murderers, wandering rogues; those that hold conspiracies, riots, and almost all delinquents which may occasion the breach of the peace and quiet of the subject; to commit to prison such as cannot find bail, and to see them brought forth in due time to trial; and bind over the prosecutors to the assizes. And if they neglect to certify examinations and informations to the next gaol-delivery, or do not bind over prosecutors, they shall be fined. A justice may commit a person that doth a felony in his own view, without warrant; but if on the information of another, he must make a warrant under hand and seal for that purpose. If complaint and oath be made before a justice of goods stolen, and the informer, suspecting that they are in a particular house, shows the cause of his suspicion, the justice may grant a warrant to the constable, &c. to search in the place suspected, to seize the goods, and person in whose custody they are found, and bring them before him or some other justice. The search on these warrants ought to be in the day-time, and doors may be broke open by constables to take the goods. The justices of peace may make and persuade an agreement in petty quarrels and breaches of the peace, where the king is not entitled to a fine, though they may not compound offences, or take money for making agreements. A justice hath a discretionary power of binding to good behaviour; and may require a recognizance, with a great penalty, of one, for his keeping of the peace, where the party bound is a dangerous person, and likely to break the peace, and do much mischief; and for default of sureties he may commit him to gaol. But a man giving security for keeping the peace in the king's bench or chancery, may have a *superse-deas* to the justices in the county not to take security; and also by giving surety of the peace to any other justice. If one make an assault upon a justice of peace, he may apprehend the offender, and commit him to gaol till he finds sureties for the peace, and a justice may record a forcible entry on his own possession: in other cases he cannot judge in his own cause. Contempts against justices are punishable by indictment and fine at the sessions. Justices shall not be regularly punished for any thing done by them in the sessions as judges; and if a justice be tried for any thing done in his office, he may plead the general issue, and give the special matter in evidence; and if a verdict is given for him, or the plaintiff be nonsuited, he shall have double costs; and such action shall only be laid in the county where the offence was committed. 7 Jac. cap. 5. 21 Jac. cap. 12. But if they are guilty of any misdemeanour in office, information lies against them in the king's bench, where they shall be punished by fine and imprisonment; and all persons who recover a verdict against a justice for any wilful or malicious injury, are entitled to double costs. By 24 Geo. II. cap. 44. no writ shall be sued out against any justice of peace, for any thing done by him in the execution of his office, until notice in writing shall be delivered to him one month before the suing out of the same, containing the cause of action, &c. within which month he may tender amends; and if the tender

be found sufficient, he shall have a verdict, &c. Nor shall any action be brought against a justice for any thing done in the execution of his office, unless commenced within six months after the act committed.

A justice is to exercise his authority only within the county where he is appointed by his commission, not in any city which is a county of itself or town corporate; having their proper justices, &c. but in other towns and liberties he may. The power and office of justices terminate in six months after the demise of the crown, by an express writ of discharge under the great seal, by writ of *superse-deas*, by a new commission, and by accession to the office of sheriff or coroner.

The origin of justices of the peace is referred to the fourth year of Edward III. They were first called *conservators* or *wardens of the peace*, elected by the county, upon a writ directed to the sheriff; but the power of appointing them was transferred by statutes from the people to the king; and under this appellation appointed by 1 Edw. III. cap. 16. Afterwards the statute 34 Edward III. cap. 1. gave them the power of trying felonies; and then they acquired the appellation of *justices*. They are appointed by the king's special commission under the great seal, the form of which was settled by all the judges A. D. 1590; and the king may appoint as many as he shall think fit in every county in England and Wales, though they are generally made at the discretion of the lord chancellor, by the king's leave. At first the number of justices was not above two or three in a county. 18 Edw. III. cap. 2. Then it was provided by 34 Edw. III. cap. 1. that one lord, and three or four of the most worthy men in the county, with some learned in the law, should be made justices in every county. The number was afterwards restrained first to six, and then to eight, in every county, by 12 Ric. II. cap. 10. and 14 Ric. II. cap. 11. But their number has greatly increased since their first institution. As to their qualifications, the statutes just cited direct them to be of the best reputation and most worthy men in the county; and the statute 13 Ric. II. cap. 7. orders them to be of the most sufficient knights, esquires, and gentlemen of the law; and by 2 Hen. V. stat. 1. cap. 4. and stat. 2. cap. 1. they must be resident in their several counties. And by 18 Hen. VI. cap. 11. no justice was to be put in commission, if he had not lands to the value of 20l. *per annum*. It is now enacted by 5 Geo. II. cap. 11. that every justice shall have 100l. *per annum*, clear of all deductions; of which he must make oath, by 18 Geo. II. cap. 20. And if he acts without such qualification, he shall forfeit 100l. It is also provided by 5 Geo. II. that no practising attorney, solicitor, or proctor, shall be capable of acting as a justice of the peace.

JUSTICES of Peace within Liberties are justices of the peace who have the same authority in cities or other corporate towns as the others have in counties; and their power is the same; only that these have the assize of ale and beer, wood and vic-tuals, &c. Justices of cities and corporations are not within the qualification act, 5 Geo. II. cap. 18.

Fountain of JUSTICE, one of the characters or attributes of the king. *SEC PREROGATIVE*. By the fountain of justice the law does not mean the *author* or *original*, but only the *distributor*. Justice is not derived from the king, as from his *free gift*; but he is the steward of the public, to dispense it to whom it is *due*. He is not the spring, but the reservoir; from whence right and equity are conducted, by a thousand channels, to every individual. The original power of judicature, by the fundamental principles of society, is lodged in the society at large; but as it would be impracticable to render complete justice to every individual, by the people in their collective capacity; therefore every nation has committed that power to certain select magistrates,

who with more ease and expedition can hear and determine complaints; and in England this authority has immemorially been exercised by the king or his substitutes. He therefore has alone the right of erecting courts of judicature: for though the constitution of the kingdom hath entrusted him with the whole executive power of the laws, it is impossible, as well as improper, that he should personally carry into execution this great and extensive trust: it is consequently necessary that courts should be erected, to assist him in executing this power; and equally necessary, that, if erected, they should be erected by his authority. And hence it is, that all jurisdictions of courts are either mediately or immediately derived from the crown, their proceedings run generally in the king's name, they pass under his seal, and are executed by his officers.

It is probable, and almost certain, that in very early times, before our constitution arrived at its full perfection, our kings in person often heard and determined causes between party and party. But at present, by the long and uniform usage of many ages, our kings have delegated their whole judicial power to the judges of their several courts; which are the grand depository of the fundamental laws of the kingdom, and have gained a known and stated jurisdiction, regulated by certain and established rules, which the crown itself cannot now alter but by act of parliament. And in order to maintain both the dignity and independence of the judges in the superior courts, it is enacted by the statute 13 W. III. c. 2. that their commissions shall be made (not, as formerly, *durante bene placito*, but) *quamdiu bene se gesserint*, and their salaries ascertained and established; but that it may be lawful to remove them on the address of both houses of parliament. And now, by the noble improvements of that law in the statute of 1 Geo. III. c. 23. enacted at the earnest recommendation of the king himself from the throne, the judges are continued in their offices during their good behaviour, notwithstanding any demise of the crown (which was formerly held immediately to vacate their seats), and their full salaries are absolutely secured to them during the continuance of their commissions: his majesty having been pleased to declare, that "he looked upon the independence and uprightness of the judges, as essential to the impartial administration of justice; as one of the best securities of the rights and liberties of his subjects; and as most conducive to the honour of the crown."

In criminal proceedings or prosecutions for offences, it would still be a higher absurdity, if the king personally sat in judgment; because in regard to these he appears in another capacity, that of *prosecutor*. All offences are either against the king's peace, or his crown and dignity; and are so laid in every indictment. For though in their consequences they generally seem (except in the case of treason and a very few others) to be rather offences against the kingdom than the king; yet, as the public, which is an invisible body, has delegated all its power and rights, with regard to the execution of the laws, to one visible magistrate, all affronts to that power, and breaches of those rights, are immediately offences against him, to whom they are so delegated by the public. He is therefore the proper person to prosecute for all public offences and breaches of the peace, being the person injured in the eye of the law. And this notion was carried so far in the old Gothic constitution (wherein the king was bound by his coronation oath to conserve the peace), that in case of any forcible injury offered to the person of a fellow-subject, the offender was accused of a kind of perjury, in having violated the king's coronation oath; *dicebatur fregisse juramentum regis-juratum*. And hence also arises another branch of the prerogative, that of *pardon*ing offences; for it is reasonable, that he only who is injured should have the power of forgiving. See PARDON.

In this distinct and separate existence of the judicial power in a peculiar body of men, nominated indeed, but not removeable at pleasure, by the crown, consists one main preservative of the public liberty; which cannot subsist long in any state, unless the administration of common justice be in some degree separated both from the legislative and also from the executive power. Were it joined with the legislative, the life, liberty, and property of the subject would be in the hands of arbitrary judges, whose decisions would be then regulated only by their own opinions, and not by any fundamental principles of law; which though legislators may depart from, yet judges are bound to observe. Were it joined with the executive, this union might soon be an over-balance for the legislative. For which reason, by the statute of 16 Car. I. c. 10. which abolished the court of star-chamber, effectual care is taken to remove all judicial power out of the hands of the king's privy-council; who, as then was evident from recent instances, might soon be inclined to pronounce that for law which was most agreeable to the prince or his officers. Nothing therefore is more to be avoided in a free constitution, than uniting the provinces of a judge and a minister of state. And indeed, that the absolute power, claimed and exercised in some European nations, is more tolerable than that of the eastern empires, is in a great measure owing to their having vested the judicial power in a parliament, or other body separate and distinct from both the legislative and executive: and if ever those nations recover their liberty, they will owe it to the efforts of those assemblies. In Turkey, where every thing is centred in the sultan or his ministers, despotic power is in its meridian, and wears a more dreadful aspect.

A consequence of this prerogative is the legal ubiquity of the king. His majesty, in the eye of the law, is always present in all his courts, though he cannot personally distribute justice. His judges are the mirror by which the king's image is reflected. It is the regal office, and not the royal person, that is always present in court, always ready to undertake prosecutions or pronounce judgment, for the benefit and protection of the subject. And from this ubiquity it follows, that the king can never be non-suit; for a non-suit is the desertion of the suit or action by the non-appearance of the plaintiff in court. For the same reason, also, in the forms of legal proceedings, the king is not said to appear by his attorney, as other men do; for he always appears, in contemplation of law, in his own proper person. From the same original, of the king's being the fountain of justice, we may also deduce the prerogative of issuing proclamations, which is vested in the king alone. See PROCLAMATION.

JUSTICE-Seat. See FOREST-Courts.

JUSTICIA, MALABAR-NUT; a genus of the monogynia order, belonging to the diandria class of plants; and in the natural method ranking under the 40th order, *Perfonate*. The corolla is ringent; the capsule bilocular, parting with an elastic spring at the heel; the stamina have only one anthera. There are 19 species, all of them natives of the East Indies, growing many feet high; some adorned with fine large leaves, others with small narrow ones, and all of them with monopetalous ringent flowers. Only two species are cultivated in our gardens, viz. the adhatoda or common Malabar-nut, and the hyf-sopifolia or snap-tree. The first grows ten or twelve feet high, with a strong woody stem, branching out widely all around; having large, lanceolate, oval leaves, placed opposite; and from the ends of the branches short spikes of white flowers, with dark spots, having the helmet of the corolla concave. The second hath a shrubby stem branching from the bottom pyramically three or four feet high; spear-shaped, narrow, entire leaves, growing opposite; and white flowers, commonly by threes, from the sides of the branches; succeeded by capsules.

which burst open with elastic force for the discharge of the seeds; whence the name of *snap-tree*. Both species flower here in summer, but never produce any fruit. They are propagated by layers and cuttings, and require the same treatment with other tender exotics.

JUSTICIAR, in the old English laws, an officer instituted by William the Conqueror, as the chief officer of state, who principally determined in all cases civil and criminal. He was called in Latin *Capitaneus Justitarius totius Angliæ*. The office of *Justiciar*, and a *Court of Justiciary*, exist at this time in Scotland.

JUSTIFICATION, in law, signifies a maintaining or showing a sufficient reason in court why the defendant did what he is called to answer. Pleas in justification must set forth some special matter: thus, on being sued for a trespass, a person may justify it by proving that the land is his own freehold; that he entered a house in order to apprehend a felon; or by virtue of a warrant, to levy a forfeiture, or in order to take a distress; and in an assault, that he did it out of necessity.

JUSTIFICATION, in theology, that act of grace which renders a man just in the sight of God, and worthy of eternal happiness. See **THEOLOGY**. The Romanists and Reformed are extremely divided about the doctrine of justification; the latter contending for justification by faith alone, and the former by good works.

JUSTIN, a celebrated historian, lived, according to the most probable opinion, in the second century, under the reign of Antoninus Pius. He wrote, in elegant Latin, an abridgment of the history of Trogus Pompeius; comprehending the actions of almost all nations, from Ninus the founder of the Assyrian empire to the emperor Augustus. The original work, to the regret of the learned, is unfortunately lost: this abridgment, being written in a polite and elegant style, was probably the reason why that age neglected the original. The best editions of Justin are, *ad usum Delphini*, in 4to; and *cum notis variorum et Gronovii*, in 8vo.

JUSTIN (St.) commonly called *Justin Martyr*, one of the earliest and most learned writers of the eastern church, was born at Neapolis, the ancient Sechem of Palestine. His father Priscus, a Gentile Greek, brought him up in his own religion, and had him educated in all the Grecian learning. To complete his studies he travelled to Egypt; and followed the sect of Plato, with whose intellectual notions he was much pleased. But one day walking by the sea side, wrapt in contemplation, he was met by a grave ancient person of a venerable aspect; who falling into discourse with him, turned the conversation by degrees from the excellence of Platonism to the superior perfection of Christianity; and reasoned so well, as to raise in him an ardent curiosity to inquire into the merits of that religion; in consequence of which inquiry, he was converted about the year 132. On his embracing that religion, he quitted neither the profession nor the habit of a philosopher: but a persecution breaking out under Antoninus, he composed *An Apology for the Christians*; and afterwards presented another to the emperor Marcus Aurelius, in which he vindicated the innocence and holiness of the Christian religion against Crescens a Cynic philosopher, and other calumniators. He did honour to Christianity by his learning and the purity of his manners; and suffered martyrdom in 167. Besides his two Apologies, there are still extant his *Dialogue with Trypho*, a Jew; two treatises addressed to the Gentiles, and another on the unity of God. Other works are also ascribed to him. The best editions of St. Justin are those of Robert Stephens, in 1551 and 1571, in Greek and Latin; that of Morel, in Greek and Latin, in 1656; and that of Dom Prudentius Marandus, a learned Benedictine, in 1742, in folio. His style is plain, and void of all ornament.

JUSTINIAN I. son of Justin the elder, was made Cæsar

and Augustus in 527, and soon after emperor. He conquered the Persians by Belisarius his general, and exterminated the Vandals; regained Africa; subdued the Goths in Italy; defeated the Moors; and restored the Roman empire to its primitive glory. When the empire was in the full enjoyment of a profound peace and tranquillity, Justinian made the best use of it, by collecting the immense variety and number of the Roman laws into one body. To this end, he selected ten of the most able lawyers in the empire; who, revising the Gregorian, Theodosian and Hermogenian codes, compiled one body, called *Codex Justinianus*. This may be called the *statute law*, as consisting of the rescripts of the emperors. But the reduction of the other part was a much more difficult task: it was made up of the decisions of the judges and other magistrates, together with the authoritative opinions of the most eminent lawyers; all which lay scattered, without any order, in no less than 2000 volumes and upwards. These were reduced to the number of 50; but ten years were spent in the reduction. However, the design was completed in the year 529, and the name of *Digest* or *Pandects* given to it. Besides these, for the use chiefly of young students in the law, to facilitate that study, Justinian ordered four books of institutes to be formed, containing an abstract or abridgment of the text of all the laws: and lastly, the laws of modern date, posterior to that of the former, were thrown into one volume in the year 529, called the *Novellæ*, or New Code. This emperor died in the year 565, aged 83, in the 39th of his reign, after having built a great number of churches; particularly the famous Sancta Sophia at Constantinople, which is esteemed a masterpiece of architecture.

JUSTINIANI (St. LAURENCE), the first patriarch of Venice, was born there of a noble family in 1381. He was a very pious prelate, and died in 1485; he left several pieces of piety, which were printed together at Lyons in 1568, in one volume folio, with his life prefixed by his nephew. Clement VII. beatified him in 1524; and he was canonized by Alexander VIII. in 1690.

JUSTINIANI (Bernard), was born at Venice in 1408. He obtained the senator's robe at the age of 19, served the republic in several embassies, and was elected procurator of St. Mark in 1474. He was a learned man, and wrote *the History of Venice*, with some other works of considerable merit; and died in 1498.

JUSTINIANI (Augustin), bishop of Nebo, one of the most learned men of his time, was descended from a branch of the same noble family with the two foregoing; and was born at Genoa in 1480. He assisted at the fifth council of the Lateran, where he opposed some of the articles of the concordat between France and the court of Rome. Francis I. of France made him his almoner; and he was five years regius professor of Hebrew at Paris. He returned to Genoa in 1522, where he discharged all the duties of a good prelate; and learning and piety flourished in his diocese. He perished at sea in his passage from Genoa to Nebo, in 1536. He composed several pieces; the most considerable of which is, *Psalterium Hebræum, Græcum, Arabicum, et Chaldeum, cum tribus Latinis interpretationibus et glossis*. This was the first psalter of the kind printed; and there is also ascribed to the same prelate a translation of Maimonides's *Mora Nevochim*.

JUSTNESS, the exactness or regularity of any thing. Justness is chiefly used in speaking of thought, language, and sentiments. The justness of a thought consists in a certain precision or accuracy, by which every part of it is perfectly true, and pertinent to the subject. Justness of language consists in using proper and well chosen terms; in not saying either too much or too little. M. de Mere, who has written on justness of mind, distinguishes two kinds of justness; the one arising from taste and genius, the other from good sense or right reason. There

are no certain rules to be laid down for the former, *viz.* to show the beauty and exactness in the turn or choice of a thought; the latter consists in the just relation which things have to one another.

JUTES, the ancient inhabitants of Jutland in Denmark.

JUTLAND, a large peninsula, which makes the principal part of the kingdom of Denmark. It is bounded on the south-east by the duchy of Holstein, and is surrounded on the other sides by the German ocean and the Baltic sea. It is about 180 miles in length from north to south, and 50 in breadth from east to west. The air is very cold, but wholesome; and the soil is fertile in corn and pastures, which feed a great number of bees, that are sent to Germany, Holland, and elsewhere. This was anciently called the *Cimbrian Chersonesus*, and is supposed to be the country from whence the Saxons came into England. It is divided into two parts, called *North* and *South Jutland*: the latter is the duchy of Sleswick, and lies between North Jutland and the duchy of Holstein; and the duke of that name is in possession of that part of it whose capital town is Gottorp, for which reason the sovereign is called the *Duke of Holstein Gottorp*.

JUVENAL (DECIVS JUNIVS), the celebrated Roman satirist, was born about the beginning of the emperor Claudian's reign, at Aquinum in Campania. His father was probably a freed man, who, being rich, gave him a liberal education, and, agreeably to the taste of the times, bred him up to eloquence; in which he made a great progress, first under Fronto the grammarian, and afterwards, as is generally conjectured, under Quintilian; after which he attended the bar, and made a distinguished figure there for many years by his eloquence. In the practice of this profession he had improved his fortune and interest at Rome before he turned his thoughts to poetry, the very style of which, in his satires, speaks a long habit of declamation; *subactum redolent declamatorem*, say the critics. It is said he was above 40 years of age when he recited his first essay to a small audience of his friends; but being encouraged by their applause, he ventured a greater publication; which reaching the ears of Paris, Domitian's favourite at that time, though but a pantomime player, whom our satirist had severely insulted, that minion made his complaint to the emperor; who sent him thereupon into banishment, under pretence of giving him the command of a cohort in the army, which was quartered at Pentapolis, a city upon the frontiers of Egypt and Libya.

After Domitian's death, Juvenal returned to Rome, sufficiently cautioned not only against attacking the characters of those in power, under arbitrary princes, but against all personal reflections upon the great men then living; and therefore he thus wisely concludes the debate he is supposed to have maintained for a while with a friend on this head, in the first satire, which seems to be the first that he wrote after his banishment:

——— *Experiar quid concedatur in illos
Quorum Flaminia tegitur cinis atque Latina.*

“I will try what liberties I may be allowed with those whose ashes lie under the Flaminian and Latin ways,” along each side of which the Romans of the first quality used to be buried.—It is believed that he lived till the reign of Adrian in 128. There are still extant 16 of his satires, in which he discovers great wit, strength, and keenness, in his language: but his style is not perfectly natural; and the obscenities with which these satires are filled render the reading of them dangerous to youth.

JUVENCUS (CAIVS VECTIVS AQUILINVS), one of the first of the Christian poets, was born of an illustrious family in Spain. About the year 320 he put the Life of Jesus Christ into Latin verse, of which he composed four books. In this

work he followed almost word for word the text of the four evangelists; but his verses are written in a bad taste, and his Latin is not pure.

JUVENTAS, in mythology, the goddess who presided over youth among the Romans. This goddess was long honoured in the Capitol, where Servius Tullius erected her statue. Near the chapel of Minerva there was the altar of Juventas, and upon this altar a picture of Proserpine. The Greeks called this goddess of youth *Hebe*; but it has been generally supposed that this was not the same with the Roman *Juventus*.

JUXON (Dr. WILLIAM), born at Chichester in 1682, was bred at Merchant-Taylors' school, and from thence elected into St. John's college Oxford, of which he became president. King Charles I. made him bishop of London; and in 1635 promoted him to the post of lord high treasurer of England. The whole nation, and especially the nobility, were greatly offended at this high office being given to a clergyman; but he behaved so well in the administration, as soon put a stop to all the clamour raised against him. This place he held no longer than the 17th of May 1641, when he prudently resigned the staff, to avoid the storm which then threatened the court and the clergy. In the following February, an act passed depriving the bishops of their votes in parliament, and incapacitating them from any temporal jurisdiction. In these leading steps, as well as the total abolition of the episcopal order which followed, he was involved with his brethren; but neither as bishop nor as treasurer was a single accusation brought against him in the long parliament. During the civil wars, he resided at his palace at Fulham, where his meek, inoffensive, and gentle behaviour, notwithstanding his remaining steady in his loyalty to the king, procured him the visits of the principal persons of the opposite party, and respect from all. In 1648 he attended on his majesty at the treaty in the isle of Wight; and, by his particular desire, waited upon him at Cotton-house, Westminster, the day after the commencement of his trial; during which he frequently visited him in the office of a spiritual father; and his majesty declared he was the greatest comfort to him in that afflictive situation. He likewise attended his majesty on the scaffold, where the king, taking off his cloak and George, gave him the latter: after the execution, this pious bishop took care of the body, which he accompanied to the royal chapel at Windsor, and stood ready with the common prayer book in his hands to perform the last ceremony for the king; but was prevented by Colonel Whichcot, governor of the castle.—He continued in the quiet possession of Fulham-palace till the ensuing year 1649, when he was deprived, having been spared longer than any of his brethren. He then retired to his own estate in Gloucestershire, where he lived in privacy till the restoration, when he was presented to the see of Canterbury; and, in the little time he enjoyed it, expended in buildings and reparations at Lambeth-palace and Croydon-house near 15,000l. He died in 1663; having bequeathed 7000l. to St. John's college, and to other charitable uses near 5000l. He published a sermon on Luke xviii. 31. and *Some Considerations upon the Act of Uniformity*.

JUXTAPOSITION, is used by philosophers to denote that species of growth which is performed by the apposition of new matter to the surface or outside of old. In which sense it stands opposed to *intussusception*; where the growth of a body is performed by the reception of a juice within it diffused through its canals.

IVY, in botany. See **HEDERA**.

IVY-BRIDGE, a village of Devonshire, remarkable for its rural and picturesque scenery; having on the N. the rude barren mountains of Dartmoor, and on the S. one of the most fertile and best cultivated countries in the kingdom; while the

river Arne, which here crosses the road from London to Plymouth, and which runs with great rapidity through the village, having its course interrupted by many huge masses of granite, which lie in a confused manner on its bed, forces its way among them with great noise and impetuosity, and, when swelled with heavy rains, exhibits a very romantic appearance. A little above the bridge (from which probably the village derives its name, is a considerable paper-manufactory. Ivy Bridge is 11 miles N. E. of Plymouth, and 20; S. W. of London.

IXER, or HIGAR, a town of Spain, in Arragon, seated on the river Martin W. lon. 0. 19. N. lat. 41. 12.

IXIA, in botany; a genus of the monogynia order, belonging to the triandria class of plants; and in the natural method ranking under the 6th order, *Ensalæ*. The corolla is hexapetalous, patent, and equal; there are three stigmata a little upright and petalous. There are several species, consisting of herbaceous, tuberous, and bulbous-rooted showery perennials, from one to two feet high, terminated by hexapetalous flowers of different colours. They are propagated by off-sets, which should be taken off in summer at the decay of the leaves: but as all the plants of this genus are natives of warm climates, few of them can bear the open air of this country in winter.

IXION, in fabulous history, king of the Lapithæ, married Dia the daughter of Deionius, to whom he refused to give the customary nuptial presents. Deionius in revenge took from him his horses; when Ixion, dissembling his resentment, invited his father-in-law to a feast, and made him fall through a trap-door into a burning furnace, in which he was immediately consumed. Ixion, being afterwards slung with remorse for his cruelty, ran mad; on which Jupiter, in compassion, not only forgave him, but took him up into heaven; where he had the impiety to endeavour to corrupt Juno. Jupiter, to be the better assured of his guilt, formed a cloud in the resemblance of the goddess, upon which Ixion begat the centaurs: but boasting of his happiness, Jove hurled him down to Tartarus, where he lies fixed on a wheel encompassed with serpents, which turn without ceasing.

IXORA, in botany; a genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 47th order, *Stellatæ*. The corolla is monopetalous, funnel-shaped, and long, superior; the stamina above the throat; the berry tetraspermous.

IXWORTH, a town in Suffolk, with a market on Friday. It is 79 miles N. E. by N. of London. Several Roman coins have been dug up here.

JYEPOUR, a city of Hindoostan Proper, capital of a territory of the same name (otherwise called Jaypour, Jaynagar, Joinagar, or Jyenagar) in the eastern quarter of Agimere, and subject to one of the Rajpoot Princes. It was built by

the celebrated Rajah Jessing, who also erected an observatory here, and invited Claude Bondier to it, in 1734. Wendel represents Jypour as a place of great wealth and consequence in 1779, being the staple of the principal part of the goods that are brought from every quarter of India. It is 136 miles W. by S. of Agra. E. lon. 76. 9. N. lat. 26. 56.

JYNY, in ornithology, a genus of birds belonging to the order of picæ; the characters of which are, that the bill is slender, round, and pointed; the nostrils are concave and naked; the tongue is very long, very slender, cylindric, and terminated by a hard point; and the feet are formed for climbing. There is only one species, viz. the *torquilla*. (See pl. 23.) The colours of this bird are elegantly pencilled, though its plumage is marked with the plainest kinds: a list of black and ferruginous strokes divides the top of the head and back; the sides of the head and neck are ash-coloured, beautifully traversed with fine lines of black and reddish-brown; the quill feathers are dusky, but each web is marked with rust-coloured spots; the chin and breast are of a light yellowish brown, adorned with sharp-pointed bars of black; the tail consists of ten feathers, broad at their ends and weak, of a pale ash-colour, powdered with black and red, and marked with four equidistant bars of black: the irides are of a yellowish colour.—The wry-neck, Mr. Pennant apprehends, is a bird of passage, appearing with us in the spring before the cuckoo. Its note is like that of the kestrel, a quick-repeated squeak; its eggs are white, with a very thin shell; it builds in the hollows of trees, making its nest of dry grass. It has a very whimsical way of turning and twisting its neck about, and bringing its head over its shoulders, whence it had its Latin name *torquilla*, and its English one of *wry-neck*: it has also the faculty of erecting the feathers of the head like those of the jay. It feeds on ants, which it very dexterously transfixes with the bony and sharp end of its tongue, and then draws them into its mouth; and while the female is sitting, the male has been observed to carry these insects to her.—We find this bird mentioned as an inhabitant throughout Europe, and of many parts of the old Continent. It is in Russia, Sweden, Lapland, Greece, Italy, Babylon, and Bengal; authorities for which Buffon mentions, and says, that at the end of summer this bird grows very fat, when it becomes excellent eating; for which reason some have named it the *Ortolan*. The young ones, while in the nest, will hiss like so many snakes; inasmuch that many have been prevented plundering the old ones of their offspring, on a supposition that they were advancing their hands on the brood of this loathsome reptile.

IZQUINTENANGO, a rich and handsome town of N. America, in New Spain, and in the province of Chiapa. The country about it produces cotton and a great number of ananas or pine-apples.

K.

K

K, the tenth letter, and seventh consonant, of our alphabet; being formed by the voice, by a guttural expression of the breath through the mouth, together with a depression of the lower jaw and opening of the teeth. Its sound is much the same with that of the hard *c* or *qu*; and it is used, for the most part, only before *e*, *i*, and *n*, in the beginning of words; as *ken*, *kiss*, *known*, &c. It used formerly to be always joined with *c* at the end of words, but is at present very properly omitted, at least in words derived from the Latin: thus, for *publick*, *musick*, &c. we say *public*, *music*, &c. However, in monosyllables it is still retained, as *jack*, *block*, *mock*, &c.

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K

K is borrowed from the Greek *kappa*, and was but little used among the Latins: Priscian looked on it as a superfluous letter; and says, it was never to be used except in words borrowed from the Greek. Dausquius, after Sallust, observes, that it was unknown to the ancient Romans.—Indeed we seldom find it in any Latin authors, excepting in the word *kalendæ*, where it sometimes stands in lieu of a *c*.—Carthage, however, is frequently spelt on medals with a *K*: SALVI AUG. ET CAES. FEL. KAR. and sometimes the letter *K* alone stood for *Carthage*.—M. Berger has observed, that a capital *K*, on the reverse of the medals of the Emperors of Constantinople,

signified *Konstantinus*; and on the Greek medals he will have it to signify ΚΟΙΛΗ ΣΥΡΙΑ, "Coelesyria."

Quintilian tells us, that in his time some people had a mistaken notion, that wherever the letter *c* and *a* occurred at the beginning of a word, *k* ought to be used instead of the *c*. See C. Lipſius observes, that *K* was a stigma anciently marked on the foreheads of criminals with a red-hot iron.

The letter *K* has various significations in old charters and diplomas; for instance, KR. stood for *chorus*, KR. C. for *cara civitas*, K R M. for *carmen*, KR. AM. N. *carus amicus noster*, K S. *chaos*, K T. *capite tonsus*, &c.

The French never use the letter *k* excepting in a few terms of art and proper names borrowed from other countries. A-blancourt, in his dialogue of the letters, brings in *k* complaining, that he has often been in a fair way to be banished out of the French alphabet, and confined to the countries of the north.

K is also a numeral letter, signifying 250, according to the verse; "*K quoque ducentos & quinquaginta tenebit.*" When it had a stroke at top, *K̄*, it stood for 250,000.

K on the French coinage denotes money coined at Bourdeaux.

KADESH, KADFSH-BARNFA, or EN-MISHPAT, in ancient geography, a city celebrated for several events. At Kadesh, Miriam the sister of Moses died (Numb. xx. 1.). Here it was that Moses and Aaron, showing a distrust in God's power when they smote the rock at the waters of strife, were condemned to die without the consolation of entering the promised land (Numb. xxvii. 14.). The king of Kadesh was one of the princes killed by Joshua (xii. 22.). This city was given to the tribe of Judah, and was situated about eight leagues from Hebron to the south. Mr. Wells is of opinion, that this Kadesh, which was situated in the wilderness of Zin, was a different place from Kadesh-barnea in the wilderness of Paran.

KADMONÆI, or CADMONÆI, in ancient geography, a people of Palestine, said to dwell at the foot of mount Hermon; which lies east, and is the reason of the appellation, with respect to Libanus, Phœnicia, and the north parts of Palestine. Called also *Hevæi* (Moses).

KÆMPFERIA, ZEDOARY, in botany; a genus of the monogynia order, belonging to the monandria class of plants; and in the natural method ranking under the 8th order, *Scitamineæ*. The corolla is sexpartite, with three of the segments larger than the rest, patulous; and one only bipartite.

The *species* are, 1. The galanga, common galangal, or long zedoary, has tuberous, thick, oblong, fleshy roots; crowned with oval, close-fitting leaves, by pairs, four or five inches long, without footstalks; and between them close-fitting white flowers, with purple bottoms, growing singly. 2. The rotunda, or round zedoary, has thick, fleshy, swelling, roundish, clustering roots, sending up spear-shaped leaves, six or eight inches long, near half as broad, on upright footstalks; and between them, immediately from the roots, rise whitish flowers, tinged with green, red, yellow, and purple centres. Both these are perennial in root; but the leaves rise annually in spring, and decay in winter. They flower in summer: each flower is of one petal, tubulous below, but plain above, and divided into six parts; they continue three or four weeks in beauty, but are never succeeded by seeds in this country. Both these plants must be potted in light rich mould, and always kept in the hot-house, giving plenty of water in summer, but more sparingly in winter. They are propagated by parting the roots in the spring, just before they begin to push forth new leaves.

This plant is cultivated with great care by many of the inhabitants of Siam for the sake of its root; the use of which is to strengthen the bowels and nervous system. The root was

was formerly used in this country in bitter infusions; but is now laid aside.

KALENDAR, a distribution of time, accommodated to the uses of life; or a table or almanac, containing the order of days, weeks, months, feasts, &c. happening throughout the year. See TIME, MONTH, YEAR, &c. It is called *kalendar*, from the word *kalendæ*, anciently written in large characters at the head of each month. See KALENDS. The days in calendars were originally divided into *octoades*, or eights; but afterwards, in imitation of the Jews, into *hebdomades*, or sevens; which custom, Scaliger observes, was not introduced among the Romans till after the time of Theodosius.

There are various calendars, according to the different forms of the year and distributions of time established in different countries. Hence the Roman, the Jewish, the Persian, the Julian, the Gregorian, &c. calendars. The ancient *Roman* calendar is given by Ricciolus, Struvius, Danet, and others; by which we see the order and number of the Roman holidays and work-days. The three *Christian* calendars are given by Wolfius in his Elements of Chronology. The *Jewish* calendar was fixed by rabbi Hillel about the year 360, from which time the days of their year may be reduced to those of the Julian calendar.

The *Roman* KALENDAR owed its origin to Romulus; but it has undergone various reformatiions since his time. That legislator distributed time into several periods, for the use of the people under his command: but as he was much better versed in matters of war than of astronomy, he only divided the year into ten months, making it begin in the spring, on the first of March; imagining the sun made his course through all the seasons in 304 days.

Romulus's calendar was reformed by Numa, who added two months more, January and February; placing them before March: so that his year consisted of 355 days, and began on the first of January. He chose, however, in imitation of the Greeks, to make an intercalation of 45 days, which he divided into two parts; intercalating a month of 22 days at the end of each two years; and at the end of each two years more another of 23 days; which month, thus interposed, he called *Marcedonius*, or the intercalary February. But these intercalations being ill observed by the pontiffs, to whom Numa committed the care of them, occasioned great disorders in the constitution of the year; which Cæsar, as sovereign pontiff, endeavoured to remedy. To this end, he made choice of Sosigenes, a celebrated astronomer of those times; who found, that the dispensation of time in the calendar could never be settled on any sure footing without having regard to the annual course of the sun. Accordingly, as the sun's yearly course is performed in 365 days six hours, he reduced the year to the same number of days. The year of this correction of the calendar was a year of confusion; they being obliged, in order to swallow up the 65 days that had been imprudently added, and which occasioned the confusion, to add two months besides the Marcedonius, which chanced to fall out that year; so that this year consisted of 15 months, or 445 days. This reformation was made in the year of Rome 708, 42 or 43 years before Christ.

The *Roman* calendar, called also *Julian* calendar, from its reformer Julius, is disposed into quadriennial periods; whereof the first three years, which he called *communes*, consist of 365 days; and the fourth, *bissextile*, of 366; by reason of the six hours, which in four years make a day or somewhat less, for in 134 years an intercalary day is to be retrenched. On this account it was, that Pope Gregory III. with the advice of Clavius and Ciaconius, appointed, that the hundredth year of each century should have no bissextile, excepting in each fourth century: that is, a subtraction is made of three bissextile days in the space of four centuries; by reason of the 11 minutes

wanting in the six hours whereof the bissextile consists. The reformation of the kalendar, or the *new style*, as we call it, commenced on the 4th of October 1582, when ten days were thrown out at once, so many having been introduced into the computation since the time of the council of Nice in 325, by the defect of 11 minutes.

Julian Christian KALENDAR is that wherein the days of the week are determined by the letters A, B, C, D, E, F, G, by means of the solar cycle; and the new and full moons, especially the paschal full moon, with the feast of Easter, and the other moveable feasts depending thereon, by means of golden numbers, rightly disposed through the Julian year. See CYCLE, and CHRONOLOGY, p. 525. In this kalendar, the vernal equinox is supposed to be fixed to the 21st day of March; and the cycle of 19 years, or the golden numbers, constantly to indicate the places of the new and full moons; yet both are erroneous. And hence arose a very great irregularity in the time of Easter. To show this error the more apparently, let us apply it to the year 1715. In this year, then, the vernal equinox falls on the 10th of March; and therefore comes too early by 11 days. The paschal full moon falls on the 7th of April; and therefore, too late, with regard to the cycle, by three days. Easter, therefore, which should have been on the 10th of April, was that year on the 17th. The error here lies only in the metempsychosis, or postposition of the moon, through the defect of the lunar cycle. If the full moon had fallen on the 11th of March, Easter would have fallen on the 13th of March; and therefore the error arising from the anticipation of the equinox would have exceedingly augmented that arising from the postposition. These errors, in course of time, were so multiplied, that the kalendar no longer exhibited any regular Easter. Pope Gregory XIII. therefore, by the advice of Aloysius Lilius, in 1582, threw 10 days out of the month of October, to restore the equinox to its place, viz. the 21st of March; and thus introduced the form of the Gregorian year, with such a provision, as that the equinox should be constantly kept to the 21st of March. The new moons and full moons, by advice of the same Lilius, were not to be indicated by golden numbers, but by epacts. The kalendar, however, was still retained in Britain without this correction: whence there was a difference of 11 days between our time and that of our neighbours. But by 24 Geo. II. c. 23. the Gregorian computation is established here, and accordingly took place in 1752.

Gregorian KALENDAR is that which, by means of epacts rightly disposed through the several months, determines the new and full moons, and the time of Easter, with the moveable feasts depending thereon, in the Gregorian year. The Gregorian kalendar, therefore, differs from the Julian, both in the form of the year, and in that epacts are substituted in lieu of golden numbers: for the use and disposition whereof, see EPOCH.

Though the Gregorian kalendar be preferable to the Julian, yet it is not without its defects (perhaps, as Tycho Brahe and Cassini imagine, it is impossible ever to bring the thing to a perfect justness). For, first, the Gregorian intercalation does not hinder but that the equinox sometimes succeeds the 21st of March as far as the 23d; and sometimes anticipates it, falling on the 19th; and the full moon, which falls on the 20th of March, is sometimes the paschal; yet not so accounted by the Gregorians. On the other hand, the Gregorians account the full moon of the 22d of March the paschal; which yet, falling before the equinox, is not paschal. In the first case, therefore, Easter is celebrated in an irregular month; in the latter, there are two Easters in the same ecclesiastical year. In like manner, the cyclical computation being founded on mean full moons, which yet may precede or follow the true ones by some hours, the paschal full-moon may fall on Saturday, which is

yet referred by the cycle to Sunday: whence, in the first case, Easter is celebrated eight days later than it should be; in the other, it is celebrated on the very day of the full-moon, with the Jews and Quartodeciman heretics; contrary to the decree of the council of Nice. Scaliger and Calvisius show other faults in the Gregorian kalendar, arising from the negligence and inadvertency of the authors; yet is this kalendar adhered to by the Romanists throughout Europe, and used wherever the Roman breviary is used.

Reformed or Corrected KALENDAR is that which, setting aside all apparatus of golden numbers, epacts, and dominical letters, determines the equinox, with the paschal full-moon, and the moveable feasts depending thereon, by astronomical computation, according to the Rudolphine Tables. This kalendar was introduced among the Protestant states of Germany in the year 1700, when 11 days were at once thrown out of the month of February; so that in 1700 February had but 18 days: by this means, the corrected style agrees with the Gregorian. This alteration in the form of the year they admitted for a time; in expectation that, the real quantity of the tropical year being at length more accurately determined by observation, the Romanists would agree with them on some more convenient intercalation.

French KALENDAR. Among the most extraordinary of the innovations of the French republicans, is the alteration of their kalendar: agreeably to their favourite project of rooting both royalty and religion from the minds of the people, they have introduced a new system, of the excellence of which the reader will judge from the following correct account taken from authentic documents.

By a decree of the *French National Convention*, passed Oct. 15th, 1793, for the reform of the kalendar, the following regulations were adopted:

1. The French æra commences from the foundation of the republic, which took place on the 22d of Sept. 1792, of the vulgar æra, the day on which the sun arrived at the true autumnal equinox, entering the sign of the balance 9 hours 18 minutes 30 seconds A. M. for the observatory of Paris.

2. The vulgar æra is abolished for civil purposes.

3. The commencement of each year is fixed at midnight, the beginning of that day in which falls the true autumnal equinox for the observatory of Paris.

4. The year is divided into twelve equal months, of thirty days each, after which five supplementary days are added to complete the 365 days of the ordinary year. These five days do not belong to any month.

5. Each month is divided into three decades, of ten days each; distinguished by first, second, and third.

6. The twelve months, the five supplementary days, and the ten days of the decade, shall be named *ordinally*—the first, second, third month, &c. the first, second, third supplementary day; the first, second, third day of the first, second, third decade. Nevertheless, when speaking of a very late period, we may say the fifteenth or twenty-fifth day of the first, second, or third month, of the year, &c.

7. The years which shall receive an intercalary day as the position of the equinox shall require, now called Bissextile, or Embolismic, are named Olympic. The period of four years, ending with an Olympic year, is called an Olympiad.

8. The intercalary day of the Olympic year shall always be placed after the five supplementary days; it shall be called the day of the Revolution.

9. The day from midnight to midnight is divided into ten parts, each part into ten others, and so on to the least measurable portion of time.

10. The second year of the republic commenced, according to the old calendar, on the 22d of September, 1793, at mid-

night, the true autumnal equinox falling, for the observatory of Paris, 9 hours 7 minutes 19 seconds A. M.

The 6th and 8th articles underwent some alteration in consequence of a report made by *Fabre d'Églantine*, one of the Deputies of Paris to the Convention.

"The commission you have named (says he) to render the new kalendar more sensible to the thought, and more accessible to the memory, have accordingly conceived they should attain this end, if they could succeed in striking the imagination by denominations, and in instructing by nature and a series of images.

"The first idea which has served us as a basis, is to consecrate, by this kalendar, the agricultural system, and to lead the nation towards it by marking the epochs and fractions of the year by signs either intelligible or visible, drawn from agriculture and rural economy.

"The more stations and points of support are presented to the memory, the greater is the facility with which it acts. We have accordingly contrived to give to each of the months of the year a characteristic name, which may express the temperature that is proper to it, and the kind of productions of the earth then existing, and which may indicate at the same time the nature of the season in which it is stationed, among the four that compose the year.

"This last effect is produced by four appropriate terminations, each for three succeeding months, and producing four sounds, each of them pointing out to the ear the season to which it is applied.

"We have even endeavoured to profit by the imitative harmony of the language, in the composition and prosody of these words, and in the mechanism of their terminations, inasmuch that the names of the months which compose the autumn have a grave sound and a medium measure, those of winter a heavy sound and a long measure, those of spring a sprightly sound and a short measure, and those of summer a sonorous expression and a large measure.

"Thus the first three months of the year of which the autumn is composed, take their etymology, the first from the vintage, which takes place from September to October: this month is named *Vendémiaire*. The second, from the mists and low fogs, which are the transudation (if I may so express myself) of nature from October to November: this month is named *Brumaire*. The third, from the cold, sometimes dry and sometimes moist, which is felt from November to December: this month is named *Frimaire*.

"The three winter months take their etymology, the first from the snow, which whitens the earth from December to January: this month is named *Nivôse*. The second from the rains, which usually fall in greater abundance from January to February: this month is called *Pluviose*. The third from the transient showers which descend, and the wind which dries the earth, from February to March: this month is named *Ventôse*.

"The three spring months take their etymology, the first from the fermentation and development of the sap from March to April: this month is called *Germinal*. The second from the blowing of the flowers, from April to May, is named *Floreale*. And the third from the smiling fecundity of the meadow crops from May to June: this month is called *Prairial*.

"Lastly, the three summer months take their etymology, the first from the appearance of the waving ears of corn and the golden harvests which cover the fields from June to July: this month is named *Messidor*. The second from the heat, at once solar and terrestrial, which inflames the air from July to August: this month is called *Thermidor*. The third from the fruits gilt and ripened by the sun from August to September: this month is named *Fructidor*.

AUTUMN.	WINTER.	SPRING.	SUMMER.
<i>Vendémiaire.</i>	<i>Nivôse.</i>	<i>Germinal.</i>	<i>Messidor.</i>
<i>Brumaire.</i>	<i>Pluviose.</i>	<i>Floreale.</i>	<i>Thermidor.</i>
<i>Frimaire.</i>	<i>Ventôse.</i>	<i>Prairial.</i>	<i>Fructidor.</i>

"From these denominations, as I have already observed, it follows, that by the mere pronunciation of the names of the month every one will readily perceive three things and all their relations, namely, the kind of season, the temperature, and state of vegetation. 'Tis thus that, with relation to *Germinal*, his imagination will conceive, without any effort, by the termination of the word, that the spring commences; by the construction of the word, that the elementary agents are busied; and by the signification of the word, that the buds unfold themselves.

"After the denominations of the months, we engaged in their divisions. We perceived that the divisions of the months being periodical, and recurring three times in each month, and thirty-six times in the year, were already very well entitled decades, or revolutions of ten days; and that this generical word agreed with a thing which, being thirty-six times repeated, could not, without leading to confusion, be represented to the ear by local images. Besides, decades being merely numerical fractions, should have, through the whole course of the year, but one common and numerical denomination: the name of the month is sufficient to give to each period of the three decades the colour of the images and accidents of the months in which they are comprehended.

"As to the days, we observed that they have four complex movements, which should be impressed very distinctly on our memory, and should be present to the thought in four different ways. These four movements consist—of the diurnal movement, or the passage from one day to another—of the *decadatory* movement, or the passage from one decade to another—the monthly movement, or the passage from one month to another—and the annual movement, or the solar period.

"The defect of the kalendar, such as you have decreed it, consists in its expressing the days, decades, months, and years, by the same denomination, by common numbers, inasmuch that the figure 1, which presents merely an abstract quantity, and no image, applies equally to the year, the month, the decade and the day; inasmuch that it is necessary to say—the first day of the first decade of the first month of the first year—a mode of expression abstract, dry, destitute of ideas, painful through its prolixity, and confused in civil use, more especially after the habit of the Gregorian kalendar.

"It was our opinion, that, in imitation of the Gregorian kalendar, of which the seven days of the week bear the stamp of judicial astrology (a ridiculous prejudice it is necessary to reject), we ought to create names for each of the ten days of the decade. It also struck us that, since these names were to be repeated, each thirty-six times in the course of the year, it was expedient to deprive them of images, which, being local in their very essence, could have no relation to the thirty-six stations of each of these names. We perceived, finally, that it would be a great prop to the memory, if we were to succeed in distinguishing the names of the day of the decade from common numbers, preserving, nevertheless, the signification of these numbers in a compound word, so that we might, in the same word, profit at once by the numbers, and by a name differing from the numbers. Thus, to express the ten days of the decade, we say, *Primidi—Duodi—Tridi—Quartidi—Quintidi—Sextidi—Septidi—Octidi—Nonidi—Decadi*.

"In this way, the difference between *Primidi* and *Duodi* expresses the passage from the first to the second day of the decade. This is the first movement of the days. The common numbers, from one to thirty, express the third, the monthly movement. The combination of these common numbers with the

names *Primidi*, *Duodi*, &c. expresses the second or decadatory movement. Thus the eleventh day of the month, and *Primidi*, will furnish the idea of the first day of the second decade, and so on of the rest.

"The very sensible advantage which will be drawn from the preservation of the common numbers in the compounded words *Primidi*, *Duodi*, *Tridi*, &c. is, that the day of the month will be constantly present to the recollection, without the necessity of recurring to the material calendar. For example, it is sufficient to know that the present day is *Tridi*, to be certain that it is also either the third, the thirteenth, or twenty-third day of the month; that it is *Quartidi*, to be satisfied that it is either the fourth, fourteenth, or twenty-fourth; and so on.

"We always know pretty nearly whether the month is at its commencement, its middle, or its end. Thus will it be said, *Tridi* is the third day at the commencement of the month, the thirteenth at its middle, the twenty-third at its close. Now this very simple calculation could not be effected, if the common numbers, which are here the denominators of the day, did not enter into the composition of the names of the days of the decade."

In expressing the fourth or *annual* movement, the reporter recurs to his fundamental idea, and endeavours to draw from agriculture something on which the memory may repose, and which, in the reckoning and progress of the year, may convey useful instruction. The new French calendar, in consequence, arranges in the column of each month, the names of seeds, pasturages, trees, roots, flowers, fruits, and plants, which are so disposed that the place and the proportion occupied by each production, are precisely the time and the day when nature presents them to mankind.

At each *Quintidi*, that is to say, at each half decade, the fifth, fifteenth, and twenty-fifth days of each month, is inscribed a domestic animal: and betwixt the date of this inscription and the true utility of the animal inscribed there is a precise agreement.

Each termination of the decade, each *Decadi*, is marked with the name of an agricultural instrument, the same the labourer employs at the precise time at which it is placed; inasmuch that he will find, by opposition, on the day consecrated in the calendar, the instruments he is to take up on the morrow.

There is one month in which the earth is sealed up, and usually covered with snow: this is the month *Nivose*, the time of the earth's repose. Not being able to find on its surface, during this period, any vegetable or agricultural production that can be expressed, the productions, the substances of the animal and mineral kingdoms absolutely and immediately useful to agriculture are substituted.

It remains to speak of the days which were at first named *epagomènes*, afterwards *complementary*, and since *sanfculotides*. The word *complementary*, according to our conception, being merely didactic, and consequently dull and mute to the imagination, would present to the people nothing but a cold idea which they themselves commonly render by the paraphrase of *balance* of account, or by the barbarism of *definition*. "It has struck us," says the reporter, "that these five days would need a collective denomination bearing the stamp of rationality, and capable of expressing at once the cheerfulness and the genius of the nation, during the five days of the festival to be celebrated at the termination of each year.

"Our ancestors, the Gauls, from the remotest antiquity, conceived themselves honoured by their national appellation. History informs us that a part of Gaul, afterwards called *Lyonnoise*, the country of the Lyonnois, was entitled *Gallia braccata*, *breeched Gaul*. Consequently the rest of Gaul, as far as the banks of the Rhine, was *Gallia non braccata*, *unbreeched Gaul*:"

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our forefathers were therefore *sanfculottes*. Whether the origin of the denomination be ancient or modern, as liberty has rendered it illustrious, so should it be dear to us: this is sufficient to give it a solemn consecration. We shall accordingly call the five days, collectively taken, the *Sanfculotides*.

"The five *Sanfculotide* days, composing a half decade, are to be denominated *Primidi*, *Duodi*, *Tridi*, *Quartidi*, and *Quintidi*: and, in the bissextile year, the sixth day *Sextidi*. On the following day the new year commences by *Primidi* the first of *Vendémiaire*."

Five public festivals are to be held on the *Sanfculotides*; and every fourth year, at the end of the bissextile year, on the sextide, or sixth day of the *Sanfculotides*, national sports are to be celebrated. This epoch of one day is by way of distinction styled *The Sanfculotide*; a title reckoned the most analogous to the assemblages of different portions of the French people from every part of the Republic, to celebrate liberty and equality at this epoch.

The following specimen will convey a more perfect idea of the new calendar, and of the contrast it forms with the old one:

	J A N V I E R.	NIVOSE; IV mois.
Nouv. Lune le 1 à 11 h 57 m. du soir.	1 merc. <i>La Circoncision</i>	duodi . 12 Thérébentine
	2 jeudi; f. Macaire	tridi . 13 Argile
	3 vend. fte Genevieve	quartidi 14 Marne
	4 sam. fte Pharilde	quintidi 15 LAPIN
	5 Dim. f. Telesph.	sextidi . 16 Plâtre
	6 lundi; <i>Les Rois</i>	septidi . 17 Pierre à chaux
	7 mardi. f. Lucien	oetidi . 18 Ardoise
	8 merc. fte Gudule	nonidi . 19 Sable
Pr. Q. le 8 à 5 h. 11 m. du soir	9 jeudi; f. Julien	<i>Decadi</i> . 20 VAN
	10 vend. f. Paul Herm.	primidi . 21 Grès
	11 sam. f. Hygin	duodi . 22 Silex
	12 Dim. f. Arcade	tridi . 23 Mercure
	13 lundi; f. Godefroi	quartidi 24 Plomb
	14 mardi; f. Hilaire	quintidi 25 CHAT
Pl. L. le 16 à 3 h. 49 m. du mat.	15 merc. f. Maur	sextidi . 26 Etain
	16 jeudi; f. Marcel	septidi . 27 Cuivre
	17 vend. f. Antoine	oetidi . 28 Fer
	18 sam. f. C. Pierre	nonidi . 29 Sel
	19 Dim. f. N. de Jesus.	<i>Decadi</i> . 30 CRIBLE.
	20 lundi; ff. Fab. & Séb.	PLUVIOSE; V mois.
Der. Q. le 24 à 9 h. 2 m. du mat.	21 mardi; fte Agnès	primidi . 1 Lauréole
	22 merc. f. Vincent	duodi . 2 Mousse
	23 jeudi; fte Emérent.	tridi . 3 Fragon
	24 vend. f. Timothée	quartidi . 4 Perce-neige
	25 sam. Conv. f. Paul	quintidi . 5 TAUREAU
	26 D.m. f. Polycarpe	sextidi . 6 Laurier-thym
	27 lundi; f. Jean Chrifost.	septidi . 7 Mente
	28 mardi; f. Cyrille	oetidi . 8 Mézérion
N. L. le 31 à 4 h. 37 m. du mat.	29 merc. f. Franc. de S.	nonidi . 9 Peuplier
	30 jeudi; fte Aldegonde	<i>Decadi</i> . 10 COIGNÉE
	31 vend. f. Pierre Nol.	primidi . 11 Ellébore
		duodi . 12 Brocoli.

Construction of a KALENDAR, or Almanac. 1. Compute the sun's and moon's place for each day of the year; or take them from ephemerides. 2. Find the dominical letter, and by means thereof distribute the kalendar into weeks. 3. Compute the time of Easter, and thence fix the other moveable feasts. 4. Add the immoveable feasts, with the names of the martyrs. 5. To every day add the sun's and moon's place, with the rising and setting of each luminary; the length of day and night; the crepuscula, and the aspects of the planets. 6. Add in the proper places the chief phases of the moon, and the sun's entrance into the cardinal-points; i. e. the solstices and equinoxes; together with the rising and the setting, especially heliacal, of the planets and chief fixed stars. See ASTRONOMY.

The duration of the crepuscula, or the end of the evening and beginning of the morning twilight, together with the sun's rising and setting; and the length of days, may be transferred from the kalendars of one year into those of another; the differences in the several years being too small to be of any consideration in civil life. Hence it appears, that the construction of a kalendar has nothing in it of mystery or difficulty, if tables of the heavenly motions be at hand.

Some divide kalendars or almanacs into *public* and *private*, *perfect* and *imperfect*; others into *Heathen* and *Christian*.

Public ones are those of a larger size; more commonly called *street-almanacs*, usually hung up for common or family use; private are those of a smaller kind, bound up to be carried about in the pocket. Perfect, are those which have the dominical letters as well as primes and feasts inscribed on them; imperfect, those which have only the primes and immoveable feasts. Till about the fourth century, they all carry the marks of heathenism; from that age to the seventh, they are generally divided between heathenism and christianity.

Almanacs are of somewhat different composition, some containing more points, others fewer. The essential part is the kalendar of months and days, with the rising and setting of the sun, age of the moon, &c. To these are added various parerga, astronomical, astrological, meteorological, chronological, and even political, rural, medical, &c. as calculations, and accounts of eclipses, solar ingresses, aspects, and configurations of the heavenly bodies, lunations, heliocentric and geocentric motions of the planets, prognostics of the weather, and predictions of other events, tables of the planetary motions, the tides, terms, interest, twilight, equation, kings, &c.

Gelalcan or *Jellalcan* KALENDAR is a correction of the Persian kalendar, made by order of sultan Gelaeddin, in the 467th year of the Hegira; of Christ 1089.

KALENDAR is also applied to various other compositions respecting the 12 months of the year. In this sense, Spencer has given the shepherd's kalendar; Evelyn and Miller the gardener's kalendar, &c.

KALENDAR is used for the catalogue or fasti anciently kept in each church of the saints both universal and those particularly honoured in each church; with their bishops, martyrs, &c. Kalendars are not to be confounded with martyrologies, for each church had its peculiar kalendar; whereas the martyrologies regarded the whole church in general, containing the martyrs and confessors of all the churches. From all the several kalendars were formed one martyrology: so that martyrologies are posterior to kalendars.

KALENDAR is also extended to an orderly table or enumeration of persons or things. Lord Bacon wishes for a kalendar of doubts. A late writer has given a kalendar of the persons who may inherit estates in fee-simple.

KALENDAR, *Kalendariu*, originally denoted, among the Romans, a book containing an account of moneys at interest, which became due on the kalends of January, the usual time when the Roman usurers lent out their money.

KALENDAR *Months*, the solar months, as they stand in the kalendar, viz. January 31 days, &c.

Astronomical KALENDAR, an instrument engraved upon copper-plates, printed on paper, and passed on-board, with a brass slider which carries a hair, and shows by inspection the sun's meridian altitude, right ascension, declination, rising, setting, amplitude, &c. to a greater exactness than our common globes will show.

KALENDAR *of Prisoners*. See CALENDAR.

KALENDAR *Brothers*, a sort of devout fraternities, composed of ecclesiastics as well as laymen; whose chief business was to procure masses to be said, and alms distributed, for the souls of such members as were deceased. They were also denominated

kalend-brothers, because they usually met on the kalends of each month, though in some places only once a quarter.

KALENDARUM-FESTUM. The Christians retained much of the ceremony and wantonness of the kalends of January, which for many ages was held a feast, and celebrated by the clergy with great indecencies, under the names *festum kalendarum*; or *hypodidionarum*; or *stultorum*, that is, "the feast of fools," sometimes also *libertas decembria*. The people met masked in the church; and in a ludicrous way proceeded to the election of a mock pope, or bishop, who exercised a jurisdiction over them, suitable to the festivity of the occasion. Fathers, councils, and popes, long laboured to restrain this licence, to little purpose. We find the feast of the kalends in use as low as the close of the 15th century.

KALENDERS. See CALENDERS.

KALENDUS, or CALENDUS, in the Roman chronology, the first day of every month. The word is formed from *καλέω*, *I call*, or *proclaim*; because, before the publication of the Roman fasti, it was one of the offices of the pontifices to watch the appearance of the new moon, and give notice thereof to the *rex sacrficulus*; upon which a sacrifice being offered, the pontiff summoned the people together in the Capitol, and there with a loud voice proclaimed the number of kalends, or the day whereon the nones would be; which he did by repeating this formula as often as there were days of kalends, *Celo Juno Novella*. Whence the name *calendæ* was given thereto, from *calo*, *calare*. This is the account given by Varro. Others derive the appellation hence, that the people being convened on this day, the pontifex called or proclaimed the several feasts or holidays in the month; a custom which continued no longer than the year of Rome 450, when C. Flavius, the curule ædile, ordered the fasti or kalendar to be set up in public places, that every body might know the difference of times, and the return of the festivals.

The kalends were reckoned backwards, or in a retrograde order. Thus, v. g. the first of May being the kalends of May; the last or the 30th of April was the *pridie kalendarum*, or second of the kalends of May; the 29th of April, the third of the kalends, or before the kalends; and so back to the 13th, where the ides commence; which are likewise numbered invertedly to the fifth, where the nones begin; which are numbered after the same manner to the first day of the month, which is the kalends of April. See IDES, and NONES. The rules of computation by kalends are included in the following verses:

Prima dies mensis æquisque est dicta kalendæ:

Sex Mains nonas, October, Julius, & Mars;

Quatuor at reliquæ habet idus quilibet octo.

Inde dies reliquæ omnes dicæ esse kalendas;

Quas retro numerans dicæ a mense sequente.

To find the day of the kalends answering to any day of the month we are in, see how many days there are yet remaining of the month, and to that number add two: for example, suppose it the 22d day of April; it is then the 10th of the kalends of May. For April contains 30 days: and 22 taken from 30, there remain 8; to which two being added, the sum is 10. The reason of adding two is, because the last day of the month is called *secundo kalendas*, the last but one *tertio kalendas*, &c. The Roman writers themselves are at a loss for the reason of this absurd and whimsical manner of computing the days of the month: yet it is still kept up in the Roman chancery: and by some authors, out of a vain affectation of learning, preferred to the common, more natural, and easy manner.

KALENDUS are also used in church-history to denote conferences anciently held by the clergy of each deanry, on the first day of every month, concerning their duty and conduct, especially in what related to the imposition of penance.

KALENDS of January, in Roman antiquity, was a solemn festival consecrated to Juno and Janus; wherein the Romans offered vows and sacrifices to those deities; and exchanged presents among themselves as a token of friendship. It was only a melancholy day to debtors, who were then obliged to pay their interests, &c. Hence Horace calls it *triplex kalendæ*; lib. i. Serm. sat. 3.

KALI, in botany. See **SALSOLA**.

KALISCH, a palatinate of Poland, bounded on the W. by the palatinate of Posen, on the E. by that of Syrad, on the N. by Western Prussia, and on the S. by Silesia. This province was forcibly seized by the king of Prussia in 1793.

KALISCH, a town of Poland, capital of a palatinate of the same name, where the Jesuits had a magnificent college. It is seated on the river Prozna, in a morass, which renders it difficult of access, 110 miles W. of Warsaw. E. lon. 18. 5. N. lat. 52. 0.

KALMIA, in botany; a genus of the monogynia order, belonging to the decandria class of plants; and in the natural method ranking under the 18th order, *Bicornes*. The calyx is quinquepartite; the corolla salver shaped, formed with five nectariferous horns on the under or outer side; the capsule quinquelocular. Of this genus there are two species, viz.

1. The *latifolia*, a most beautiful shrub, which rises usually to the height of five or six feet, and sometimes twice that height in its native places. The stems of some are as big as the small of a man's leg, though generally they are smaller, and covered with a brown rough bark. The wood is very close-grained, heavy, and hard like box. The limbs in general are crooked, and grow irregular; but are thick-clothed with stiff smooth leaves of a shining bright green. The flowers grow in bunches on the tops of the branches to foot-stalks three inches long: they are white stained with purplish red, consisting of one leaf in form of a cup divided at the verge into five sections: in the middle is a stylus and 12 stamina; which, when the flower first opens, appear lying close to the sides of the cup at equal distances, their apices being lodged in ten little hollow cells, which, being prominent on the outside, appear as so many little tubercles. The flowers are succeeded by small round capsules; which, when ripe, open in five parts, and discharge their small dust-like seeds. This plant is a native of Carolina, Virginia, and other parts of the northern continent of America; yet are not common, but found only in particular places; they grow on rocks hanging over rivulets and running streams, and on the sides of barren hills. They blossom in May, and continue in flower the greatest part of the summer. The noxious qualities of this elegant plant lessen that esteem which its beauty claims; for, although deer feed on its green leaves with impunity, yet when cattle and sheep, by severe winters deprived of better food, feed on the leaves of these plants, a great many of them die annually.

2. The *angustifolia*, rises to the height of about 16 feet, producing ever green leaves in shape like the lauro-cerasus, but small, and of a shining dark green. The flowers grow in clusters, the buds of which appear in autumn wrapped up in a conic scaly perianthium, on which is lodged a viscous matter, which protects them from the severe cold in winter. These buds dilating in the following spring, break forth into twenty or more monopetalous flowers divided into five segments, and set singly on pedicles half an inch long. These flowers, when blown, appear white; but, on a near view, are of a faint blueish colour, which as the flower decays grows paler. One of the five petals is longer and more concave than the rest, and is blended with purple, green, and yellow specks, being a viscous matter on the extremities of very fine hairs. The convex side of the same petal is also speckled with yellowish green. The pointal rises from the centre of the flower, and has its head adorned with

scarlet, and surrounded by 10 stamina, whereof three are long and seven short, whose farina issues out at a small round hole at its top. This elegant tree adorns the western and remote parts of Pennsylvania, always growing in the most sterile soil, or on the rocky declivities of hills and river-banks, in shady moist places.

KALMUCS, a tribe of Tartars called also *Eutbs*, inhabiting the larger half of what the Europeans call *Western Tartary*. Their territory extends from the Caspian sea, and the river Yaik or Ural, in 72 degrees of longitude from Ferro, to mount Altay, in 110 degrees, and from the 40th to the 52d degree of north latitude: whence it may be computed about 19,50 miles in length from west to east, and in breadth from north to south about 650 miles where broadest. It is bounded on the north by Russia and Siberia, from which it is separated by a chain of mountains; on the east by mount Altay; on the south by the countries of Karazin and the two Bukharias, from which it is also separated partly by a chain of mountains and partly by some rivers. See **TARTARY**.

Of the Kalmuc Tartars the following curious account is given by professor Pallas: They are in general, says he, of a middle size, and it is even rare to see among them a person that is tall; the women especially are of low stature, and have very agreeable features. Their limbs are neatly turned, and very few have any defects contrasted in infancy. Their education, being left solely to nature, procures for them a well-formed body and sound constitution. The only defect which is common among them is their having the thighs and legs somewhat bent. A fat person is hardly ever to be met with; the richest and most distinguished, though they lead a life sufficiently indolent, and enjoy abundance of every thing they desire, are never excessively corpulent. Their skin is pretty fair, especially when young; but it is the custom of the lower sort to allow their male children to go quite naked both in the heat of the sun and in the smoky atmosphere of their felt huts: the men too sleep naked, covered only with their drawers; and from these circumstances they acquire that yellowish-brown colour which characterises them. The women, on the contrary, have a very delicate complexion; among those of a certain rank are found some with the most beautiful faces, the whiteness of which is set off by the fine black of their hair; and in this as well as in their features they perfectly resemble the figures in Chinese paintings.

The physiognomy which distinguishes the Kalmucs is pretty generally known. Strangers are made to believe that it is frightfully deformed; and though indeed there are very ugly men to be found, yet in general their countenance has an openness in it that bespeaks a mild, a frank, and social disposition. In many it is of a roundish shape, and exceedingly agreeable; among the women some would be thought beauties even in those European cities where the taste is most scrupulous. The characteristic features of a Kalmuc or Mongol countenance are the following; The interior angle of the eye is placed obliquely downwards towards the nose, and is acute and fleshy; the eye-brows are black, narrow, and much arched; the nose is of a structure quite singular, being generally flat and broken towards the forehead; the cheek-bone is high, the head and face very round; the eye is dark, the lips thick and fleshy, the chin short, and the teeth exceedingly white, continuing so to old age; the ears are of an enormous size, standing out from the head. These characters are more or less visible in each individual; but the person that possesses them all in the highest degree is considered as the most beautifully formed.

Amongst all the Mongul nations, the men have much less beard than in our European countries, and among the Tartars it appears much later. The Kalmucs have most of it; and yet even with them the beard is very scanty and thin, and few have much hair on any other part of the body.

People that lead a pastoral life enjoy the bodily senses in

the greatest perfection. The Kalmucs find the subtilty of their sense of smell very useful in their military expeditions, for by it they perceive at a distance the smoke of a fire or the smell of a camp. There are many of them who can tell by applying the nose to the hole of a fox, or any other quadruped, if the animal be within or not. They hear at a great distance the trampling of horses, the noise of an enemy, of a flock of sheep, or even of strayed cattle; they have only to stretch themselves on the ground, and to apply their ear close to the turf. But nothing is more astonishing than the acuteness of sight in most of the Kalmucs, and the extraordinary distance at which they often perceive very minute objects, such as the dust raised by cattle or horses, and this from places very little elevated in immense level deserts; though the particular inequalities of the surface, and the vapours which in fine weather are seen to undulate over the soil in great heats, considerably increase the difficulty. They are also accustomed to trace the print of a foot in these deserts by the sight alone.

These people possess many good qualities, which give them a great superiority over the wandering Tartars. A certain natural sagacity, a social disposition, hospitality, eagerness to oblige, fidelity to their chiefs, much curiosity, and a certain vivacity accompanied with good humour, which hardly ever forsakes even the most wretched among them, form the fair side of their character. On the other hand, they are careless, superficial, and want true courage; besides, they are remarkable for credulity, distrust, and a natural inclination, authorised by custom, for drunkenness and debauchery, but especially for a great degree of cunning, which they too often practise. The disposition to indolence is common and natural, especially among the men, to all Asiatic nations, who lead a kind of life exempt from subjection and devoid of activity; but this is less to be perceived among the Kalmucs, on account of their natural vivacity, and does not prevent their endeavours to oblige. Those among them who exercise any little trade, or who are reduced by poverty to hire themselves to the Russians either for labour or for fishing, are very assiduous and indefatigable. They sleep but little, going to rest late and rising with the sun. To sleep through the day, unless a person is drunk, is considered by them as dishonourable. But their extreme dirtiness can neither be disguised nor justified, and proceeds much more from their education, from the slovenliness attached to the profession of a herdsman, and from levity, than from laziness; for the Kalmuc women are indefatigable in whatever concerns domestic matters: and it is for this reason, as well as on the score of sensuality, that the Kirgisiens are eager to seize and carry them off whenever an opportunity presents itself.

With regard to the intellectual faculties of the Kalmucs, notwithstanding their want of instruction and information, they possess good natural parts, an excellent memory, and a strong desire to learn. They acquire the Russian language with great facility, and pronounce it well; in which last article they very much surpass the Chinese. It would be very easy to civilize them, if their petulance and manner of life did not render it impracticable.

Although the Kalmucs are generally of a sanguine and choleric temperament, they live more amicably together than one could expect in a people that lead so independent a life. They seldom come to blows even over their cups, and their quarrels are hardly ever bloody. A murder very rarely happens, though their anger has something in it exceedingly fierce. It would seem that the morality of their religion, though extremely idolatrous, has been able to moderate their natural disposition in this respect; for, in consequence of their dogmas with regard to the transmigration of souls, every wanton murder either of men or beasts is thought a deadly sin.

The Kalmucs are exceedingly affable; and of so social a

disposition, that it is rare for a traveller to perceive another even at the distance of several miles without going to salute him, and to enquire into the object of his journey. When a troop of Kalmucs perceive any person at a distance, it is customary for them to detach one of their number to the next eminence, from whence he makes a signal with his cap for the person to draw near. If this signal is not obeyed, the person is considered as an enemy or a robber, and is often pursued as such. They enter willingly into friendships: but these connections are not quite disinterested; for to give and to receive presents are with them essential articles. A mere trifle, however, is sufficient to induce them to do you all manner of service; and they are never ungrateful as far as they are able. Adversity cannot deprive them of courage, nor alter their good humour. A Kalmuc will never beg if he were in the extremest misery, but rather endeavour to acquire a subsistence by cheating; and when no other way remains, he will hire himself to some rich individual of his nation, or to some Russian, either as a herdsman, a fisherman, or for any other sort of labour. Very few of the rich value themselves much upon their wealth; but those who do, show no contempt for the poor of their own nation; though the meaner sort pay their court very obsequiously to the rich, who are always surrounded with a swarm of idle dependants.

Nothing can be more prudent than that exercise of hospitality practised by wandering nations: it is of the greatest advantage to those among them who travel across their deserts; and each individual who practises it, may rely on reaping the benefit of it wherever he goes. A Kalmuc provided with a horse, with arms and equipage, may ramble from one place to another for three months together, without taking with him either money or provisions. Wherever he comes he finds either distant relations or friends to whom he is attached by the ties of hospitality, from whom he meets with the kindest reception, and is entertained in the best manner their circumstances afford. Perhaps he lodges in the first unknown cottage he finds upon his road; and scarcely has he entered it, but his wants are supplied with the most affectionate cordiality. Every stranger, of whatsoever nation, never fails to be well received by a Kalmuc; and he may depend upon having his effects in the greatest security the moment he has put himself under the protection of his host: for, to rob a guest, is considered by the Kalmucs as the most abominable of all crimes.

When the master of the house sits down to meat in company with others of inferior rank, he begins indeed by serving himself and his family, but whatever remains is distributed among the assistants. When they smoke tobacco, the pipe circulates incessantly from one to another. When any one receives a present either of meat or drink, he divides it faithfully with his companions, even though of inferior rank. But they are much more niggardly of their other effects, and especially of their cattle, and do not willingly give these away except when they hope to receive a suitable return: or if any relation has accidentally suffered the loss of his flocks, he is sure to be most willingly assisted. Perhaps too it may be related as an evidence of their hospitality, that they abandon their wives to their friends with the greatest facility, and in general they are very little inclined to jealousy.

Their robberies are never committed upon their equals, and even the greater part of the rapine exercised on other tribes is founded on hatred or national quarrels; neither do they willingly attempt this by open force, but prefer the machinations of cunning, which are so natural to them. It must also be confessed, that it is only those that live with princes, and in camps where these hold their courts, or their priests, that are most addicted to these practices: while the common people, satisfied with the pleasures of the pastoral life, spend their days

in innocent simplicity, and never attack the property of another till forced by necessity, or led by their superiors, who show them the example.

The Kalmucs are very faithful to their lawful prince; they endure every sort of oppression, and yet are with difficulty induced to revolt: but if they belong to a prince who has not become so by right of succession, they very easily rebel. They honour old age. When young men travel with such as are older than themselves, they take upon them the whole care of the cattle as well as of the feast. They are exceedingly prudent in matters that relate to their sovereign or their nation, or which are recommended to their direction by the priests, to whom they yield an unreserved obedience.

The moveable habitations of the Kalmucs are those felt huts with a conical roof in use among all the roaming Asiatics. The truly ingenious invention of these tents was undoubtedly conceived in the eastern parts of Asia, and most probably by the Mongul nations. As they can be entirely taken to pieces and folded in a small compass, they are very useful, and perfectly agree with the migratory life of these people, who are still ignorant of the use of carriages. The frame of these huts, and the felt they are covered with, though made as light as possible, yet are a sufficient load for a camel or two oxen. But the capacity of these huts, their warmth in winter, their strength in resisting tempests and excluding rain, abundantly compensate for this inconvenience. The wood endures many years; and though the felt begins to break into holes in the second year, the common people, who do not consider it as disgraceful to have them mended and patched, make them serve a good deal longer. The huts are in general use from the prince down to the meanest Kalmuc, differing only in size and in the embellishments within. In winter, they are warm even when heated with the dried excrements of their cattle, to which they are often obliged to have recourse for want of other combustibles in many places of the deserts which are destitute of wood. In summer they remove the felt to enjoy the fresh air.

The master of the tent has his bed placed opposite the door behind the fire-place. The bedsteads are low, and made of wood. The rich adorn their beds with curtains, and spread carpets of felt upon the ground. When a Kalmuc possesses an idol, he places it near the head of his bed, and sets before it several small consecrated cups full of water, milk, or other food. Before this sort of altar he fixes in the ground the trunk of a tree, on which he places a large iron basin destined to receive the libations of all the drink he makes use of in a day. On festivals the idol is decorated, the lamps are lighted, and perfumes burnt before it.

The riches of the Kalmucs, and their whole means of subsistence, depend on their flocks, which many of them reckon by hundreds and even by thousands. A man is thought capable of living on his possessions when he is master of ten cows with a bull, eight mares with a stallion. The animals they have in greatest abundance are horses, horned cattle, and sheep. Camels, which it requires time and pains to rear, cannot multiply much with them: they are besides too delicate; and it is only the rich or the priests who possess any of them. Their horses are but small, too weak for the draught, and too wild: but they do not yield to any in swiftness, and support with ease the weight of a man. They may be made to gallop for several hours successively without injury; and when necessity requires it, they can pass twice 24 hours without drinking. They have a little loof, but very hard; and they may be used at all times without being shod. In this country the horses live and perpetuate themselves without any assistance from man. The Kalmucs castrate the greater part of their male foals, and at the same time slit their nostrils, that they may breathe

more freely when they run. The stallions are never separated from the mares, that there may always be plenty of milk. The stallions are leaders of the herd, and often wander at a distance into the deserts at the head of their females, defending them from the wolves with the greatest intrepidity. The Kalmucs have the art of breaking a young horse without using a bridle. They seize him before he is two years old, by means of a noose fixed to the end of a long pole; an instrument they use in taking their riding-horses, which feed in the midst of the herd. They put no saddle at first on the colt; they mean to break, but tie a strait girth round his body; by the help of which the horseman can keep himself firm. When he is mounted, the horse is abandoned to his fury; they allow him to run and agitate himself as much as he pleases in the open plain till he is fatigued. The horseman is solicitous only to keep himself fast; and when the horse begins to abate of his impetuosity, he urges him again with the whip till his strength is almost gone: he is then saddled and bridled, and made to go for some time at a moderate pace; after which he is entirely tamed.

The horned cattle of the Kalmucs are of a beautiful shape. They keep more bulls than are necessary for the cows, and employ a great number of them as beasts of burden for carrying their houses and their other furniture from place to place. They think a bull equal to 50 cows. These and the mares give milk only while they suckle their calves or their foals, which are accordingly kept close to the tents during the day, and only suffered to suck freely during the night; a practice which the Kalmucs pretend makes their cattle stronger and more durable. They generally milk their mares three or four times a day, and sometimes every two hours when the herbage is abundant. The cows are milked but twice a day.

The Kalmuc sheep are of the same species with those found in all Great Tartary, having large tails like a bag, exceedingly fat, and which furnish a suet as soft as butter. They have also large pendent ears, and their head is much arched. Their wool is coarse, and the ewes seldom have horns. One ram is sufficient for an hundred ewes. Little use is made of the milk. The wool is fit for nothing but to make felt for the tents. A great many sheep die during winter, and a greater number still of the early lambs; the skins of which are wrought into those fine furs so much esteemed in Russia and foreign parts.

Camels belong only to the rich; for they are very dear, multiply very slowly, and are subject to many diseases. The deserts of the Wolga, and almost all those of the southern parts of Great Tartary, furnish excellent pasture for these animals; but they require not only much attention in winter, but they must be continually under the eye of the herdsmen; for, notwithstanding the advantage of their stature, they are of all animals least able to defend themselves against the wolf. They are guarded with much care against the violence of the cold and the winds of winter; nevertheless many of them die of a consumption accompanied with a diarrhoea, occasioned most probably by the moisture of their pasture and of the season. This disease, for which no remedy has been found, makes them languish for six months or more. They are in general so delicate, that a slight wound or blow often proves fatal to them. Besides, no animal is so much tormented with insects; and they often die in summer of those they swallow in eating the leaves of the oak and of the birch. The *meloe proscarabæus*, which covers all the plants in many of those places where they feed, is generally fatal to them. In spring, when they cast their hair, and which falls at once from every part of their body, they are exposed to the bite of the spider-scorpion, an animal very common in southern countries. The wound inflicted by this insect on the skin thus naked is so venomous, that the camel dies of it in less than eight days, sometimes in three. In winter, and especially after rutting-time, which happens at

the end of March, the camels become lean and weak; the bunch upon their back grows flabby, and hangs down upon the side, nor does it recover its plumpness till summer.

Camels-milk is thick, unctuous, and of a saltish taste, especially when the animals frequent pastures abounding with saline plants; and this last property makes the Kalmucs fond of it to tea. They make use of the hair for stuffing cushions, and for making ropes, packthread, and felt. It may be wrought into the most beautiful camlets, or into the finest and softest cloths. The camels with two bunches are a very uneasy seat to the person who mounts them; their trot is so heavy, and even their walk so rude, that he receives the most violent shocks at every step.

When a Kalmuc horde intends to remove in search of fresh pasture, which in summer necessarily happens every four, six, or eight days, people are in the first place dispatched to reconnoitre the best place for the khan or prince, for the lama, and for the huts containing the idols. These begin the march, and are followed by the whole troop, each choosing for himself the place he thinks most convenient. The camel that is loaded with the most precious furniture is decorated with little bells; the rest march in a string one behind another, and the bulls with burdens are driven on before. On these days the women and girls dress themselves in their best clothes, and lay on abundance of paint. They have the charge, together with the boys, of leading the flocks and the beasts of burden; and on the road they beguile the tediousness of the journey with their songs.

The Kalmucs are supplied by their flocks with milk, cheese, butter, and flesh, which are the principal articles of their food. With regard to the last, they are so little squeamish, that they not only eat the flesh of their own diseased cattle, but that of almost every sort of wild beast; and the poor will even feed upon carrion. They eat, however, the roots and stalks of many plants; such as the bulbous-rooted chervil and dandelion, &c. which they use both boiled and raw.

Their ordinary drink is the milk of mares or cows; but the former is for several reasons preferred. This, when fresh, has indeed a very disagreeable taste of garlic: but beside that it is much thinner than cow-milk, it takes as it grows sour a very agreeable vinous flavour; it yields neither cream nor curd, but furnishes a very wholesome refreshing beverage, which sensibly inebriates when taken to excess. They never make use of new milk, and still less of milk or of water that has not been boiled. Their milk is boiled as soon as it is taken from the animal; when it is cold, it is poured into a large leathern bag, in which there remains as much of the old milk as is sufficient to turn the new quantity sour, for they never think of cleansing those bags; and as the inside is lined with a crust deposited by the caseous part of the milk and other impurities, it is easy to imagine that a nauseous smell must exhale from them. But this is precisely the circumstance in which the secret consists of communicating to the milk a vinous fermentation.

In summer, and as often as the Kalmucs procure much milk from their flocks, they never fail to intoxicate themselves continually with the spirituous liquor which they know how to distil from it. Mares-milk is the most spirituous; and the quantity meant to be distilled remains twenty-four hours in summer, and three or four days in winter, in those corrupted bags we mentioned, to prepare it for the operation. The cream is left, but the butter which forms at top is taken off and reserved for other purposes. Cows-milk yields one-thirtieth part, and mares-milk one-fifteenth part of spirit. This liquor is limpid and very watery, and consequently does not take fire, but is capable of being long kept in glass-bottles. The rich Kalmucs increase its strength by a second distillation.

These people are exceedingly fond of tea and tobacco. The

former is so dear, as it comes to them from China by the way of Russia, that the poor people supply its place with various wild plants; such as a species of liquorice, the seed of the sharp-leaved dock, the roots of wild angelica, and the seed of the Tartarian maple.

The Kalmucs are excellent horsemen. Their arms are lances, bows and arrows, poniards, and crooked sabres, though the rich have fire-arms. They wear, when at war, coats of mail, which cost 50 horses, and their helmets are gilded at top. They are fond of falconry, and hunting of all sorts is their principal amusement. Their passion for play, especially with those who play cards, is carried to as great excess among them as in any other nation.

The greater part of their time is spent in diversions; and however miserable their manner of life may seem to us, they are perfectly happy with it. They cannot endure for any time the air of a close room; and think our custom of living in houses insupportable. The greatest part of them, notwithstanding the apparent unhealthiness of their way of life, arrive at a vigorous old age; their diseases are neither frequent nor dangerous. Men of 80 or 100 years old are not uncommon; and at that age they can still very well endure the exercise of riding. Simple food, the free air which they constantly breathe, a hardy vigorous constitution, continual exercise without severe labour, and a mind free from care, are the natural causes of their health and longevity.

It is very remarkable, that a migratory people, whose manner of life seems so congruous to the natural liberty of mankind, should have been subjected from time immemorial to the unlimited authority of an absolute sovereign. The Monguls of Asia afford the only instance of it; for neither written records nor ancient tradition have preserved the smallest trace of their ever having enjoyed a state of independence. On the contrary, they acknowledge that they have at all times been subject to khans and princes, whose authority has been transmitted to them by succession, and is considered as a right perfectly established, sacred, and divine.

KALNICK, a strong town of Poland, in the palatinate of Bracklaw. E. lon. 29. 18. N. lat. 48. 57.

KALO, or **KALOO**, a town of Upper Hungary, seated in a lake, 22 miles S. E. of Tockay. E. lon. 21. 54. N. lat. 47. 56.

KALUGA, a government of the Russian empire, formerly a province in the government of Moscow. It contains 12 districts, and its principal town, of the same name, is seated on the river Occa.

KAMAKURA, a famous island of Japan, about three miles in circumference, lying on the south coast of Nippon. It is here they confine their great men when they have committed any fault. The coast of this island is so steep, that they are forced to be lifted up by cranes.

KAMBALA MOUNT, a ridge of mountains in Thibet, between the lake Palte and the river Sanpoo, or Burrampooter. From the top of this ridge may be seen, to the N. a range of still higher mountains, covered with snow. The foot of Mount Kambala is 31 miles S. of Lassa.

KAMEEL, **KAMEL**, or *Camel*, a machine for lifting ships. See **CAMEL**.

KAMINIECK, a very strong town of Poland, capital of Podolia, with a castle and a bishop's see. It was taken by the Turks in 1672, who restored it, in 1690, after the treaty of Carlowitz. When the Russians forcibly seized part of the Polish territories in the beginning of 1793, this fortress held out a long time, but at last surrendered to their arms. The castle is seated on a craggy rock, 85 miles W. of Bracklaw, and 100 S. E. of Lemburg. E. lon. 26. 30. N. lat. 48. 58.

KAMSIN, the name of a hot southerly wind common in

Egypt, of which we find the following description in M. Volney's Travels.—These winds, says he, are known in Egypt by the general name of *winds of 50 days*; not that they last 50 days without intermission, but because they prevail more frequently in the 50 days preceding and following the equinox. Travellers have mentioned them under the denomination of *poisonous winds*, or, more correctly, *hot winds of the desert*. Such in fact is their quality; and their heat is sometimes so excessive, that it is difficult to form any idea of its violence without having experienced it; but it may be compared to the heat of a large oven at the moment of drawing out the bread. When these winds begin to blow, the atmosphere assumes an alarming aspect. The sky, at other times so clear in this climate, becomes dark and heavy; the sun loses his splendour, and appears of a violet colour; the air is not cloudy, but grey and thick, and is in fact filled with an extremely subtle dust, which penetrates every where. This wind, always light and rapid, is not at first remarkably hot, but it increases in heat in proportion as it continues. All animated bodies soon discover it by the change it produces in them. The lungs, which a too rarefied air no longer expands, are contracted, and become painful. Respiration is short and difficult; the skin parched and dry, and the body consumed by an internal heat. In vain is recourse had to large draughts of water; nothing can restore perspiration. In vain is coolness sought for; all bodies in which it is usual to find it deceive the hand that touches them. Marble, iron, water, notwithstanding the sun no longer appears, are hot. The streets are deserted, and the dead silence of night reigns every where. The inhabitants of towns and villages shut themselves up in their houses, and those of the desert in their tents or in wells dug in the earth, where they wait the termination of this destructive heat. It usually lasts three days, but if it exceeds that time it becomes insupportable. Woe to the traveller whom this wind surprises remote from shelter! He must suffer all its horrible effects, which sometimes are mortal. The danger is most imminent when it blows in squalls; for then the rapidity of the wind increases the heat to such a degree as to cause sudden death. This death is a real suffocation; the lungs being empty are convulsed, the circulation is disordered, and the whole mass of blood driven by the heart towards the head and breast; whence the hæmorrhage at the nose and mouth which happens after death. This wind is especially destructive to persons of a plethoric habit, and those in whom fatigue has destroyed the tone of the muscles and the vessels. The corpse remains a long time warm, swells, turns blue, and soon becomes putrid. These accidents are to be avoided by stopping the nose and mouth with handkerchiefs; an efficacious method likewise is that practised by the camels. On this occasion these animals bury their noses in the sand, and keep them there till the squall is over. Another quality of this wind is its extreme aridity; which is such, that water sprinkled on the floor evaporates in a few minutes. By this extreme dryness it withers and strips all the plants; and by exhaling too suddenly the emanations from animal bodies, crisps the skin, closes the pores, and causes that feverish heat which is the constant effect of suppressed perspiration.

KAMTCHATKA, KAMSCHATKA, or *Kamchatka*; a large peninsula on the north-eastern part of Asia, lying between 51 and 62° of north latitude, and between 173 and 182° of east longitude from the isle of Ferro. It is bounded on the east and south by the sea of Kamtchatka, on the west by the seas of Ochotsk and Penschinsk, and on the north by the country of the Koriaes.

This peninsula was not discovered by the Russians before the end of the last century. It is probable, however, that some of that nation had visited Kamtchatka before the time above mentioned. For when Volodimir Atlassoff entered upon the conquest of this peninsula in 1697, he found that the inhabi-

tants had already some knowledge of the Russians. A common tradition as yet prevails among them, that, long before the expedition of Atlassoff, one Feodotoff and his companions had resided among them, and had intermarried with the natives; and they still show the place where the Russian habitations stood. None of the Russians remained when Atlassoff first visited Kamtchatka. They are said to have been held in great veneration and almost deified by the natives; who at first imagined that no human power could hurt them, until they quarrelled among themselves, and the blood was seen to flow from the wounds which they gave each other; and soon after, upon a separation taking place, they were all killed by the natives.—These Russians were thought to be the remains of a ship's crew who had sailed quite round the north-eastern promontory of Asia called *Tschukutskoi-Nos*. The account we have of this voyage is as follows.—In 1648, seven ketches or vessels sailed from the mouth of the river Kovyma or Kolyma, lying in the frozen ocean in about 72° north latitude, and 173° or 174° east longitude from Ferro, in order to penetrate into the eastern ocean. Four of these were never more heard of; the remaining three were commanded by Simon Deshneff, Gerasim Ankudinoff, two chiefs of the Cossacs, and Feodotoff Alexeeff, head of the Promythlenics or wandering Russians, who occasionally visited Siberia. Each vessel was probably manned with about 30 persons. They met with no obstructions from the ice; but Ankudinoff's vessel was wrecked on the promontory above mentioned, and the crew were distributed on board the two remaining vessels. These two soon after lost sight of each other, and never afterwards rejoined. Deshneff was driven about by tempestuous winds till October, when he was shipwrecked on the northern part of Kamtchatka. Here he was informed by a woman of Yakutsk, that Feodotoff and Gerasim had died of the scurvy; that part of the crew had been slain; and that a few had escaped in small vessels, who had never afterwards been heard of; and these were probably the people who, as we have already mentioned, settled among the Kamtchatkans.

As the inhabitants of this country were neither numerous nor warlike, it required no great force to subdue them; and in 1711 the whole peninsula was finally reduced under the dominion of the Russians.—For some years this acquisition was of very little consequence to the crown, excepting the small tribute of furs exacted from the inhabitants. The Russians indeed occasionally hunted in this peninsula foxes, wolves, ermines, fables and other animals, whose skins form an extensive article of commerce among the eastern nations. But the fur-trade carried on from thence was very inconsiderable, until the series of islands mentioned in the next article were discovered; since which time the quantities of furs brought from these islands have greatly increased the trade of Kamtchatka, and rendered it an important part of the Russian commerce.

The face of the country throughout the peninsula is chiefly mountainous. It produces in some parts birch, poplars, alders, willows, underwood, and berries of different sorts. Greens and other vegetables are raised with great facility; such as white cabbage, turnips, radishes, beet-root, carrots, and some cucumbers. Agriculture is in a very low state, owing chiefly to the nature of the soil and the severe hoar frosts: for though some trials have been made with respect to the cultivation of grain, and oats, barley and rye have been sown; yet no crop has ever been procured sufficient in quantity or quality to answer the trouble of raising it. Hemp, however, has of late years been cultivated with great success.—Every year a vessel belonging to the crown sails from Ochotsk to Kamtchatka laden with salt, provisions, corn, and Russian manufactures; and returns in June or July of the following year with skins and furs.

Many traces of volcanoes have been observed in this peninsula; and there are some mountains which are in a burning state at

present. The most considerable of these is situated near the middle of the peninsula. In 1762, a great noise was heard issuing from the inside of that mountain, and flames of fire were seen to burst from different parts. These flames were immediately succeeded by a large stream of melted snow-water, which flowed into the neighbouring valley, and drowned two natives who were there on a hunting party. The ashes and burning matters thrown from the mountain were spread over a surface of 300 versts. In 1767 was another discharge, but less considerable. Every night flames of fire were observed streaming from the mountain; and considerable damage was done by the eruption which attended them. Since that year no flames have been seen; but the mountain emits a constant smoke.

Kamtschaka is divided by the Russians into four districts; and the government of the whole is dependent upon, and subject to, the inspection of the chancery of Ochotsk. The whole Russian force stationed in this peninsula amounts to no more than 300 men. The present population of Kamtschatka is very small, amounting to scarce 4000 souls. Formerly the inhabitants were more numerous; but in 1768 the small-pox carried off 5368 persons. There are now only about 700 males in the whole peninsula who are tributary, and few more than 100 in the neighbouring islands, called the *Kuril Isles*, who are subject to Russia. The fixed annual tribute consists in 279 fables, 464 red foxes, 50 sea-otters with a dam, and 38 cub otters. All furs exported from Kamtschatka pay a duty of 10 *per cent.* to the crown; the tenth part of the cargoes brought from the neighbouring islands is also delivered into the customs.

The natives of Kamtschatka are as wild as the country itself. Some of them have no fixed habitations, but wander from place to place with their herds of rein-deer; others have settled habitations, and reside upon the banks of the rivers and the shore of the Penschinska sea, living upon fish and sea-animals, and such herbs as grow upon the shore: the former dwell in huts covered with deer-skins; the latter in places dug out of the earth; both in a very barbarous manner. Their dispositions and tempers are rough; and they are entirely ignorant of letters or religion. The natives are divided into three different peoples, namely, the Kamtschatkans, Koreki, and Kuriles. The Kamtschatkans live upon the south side of the promontory of Kamtschatka: the Koreki inhabit the northern parts on the coast of the Penschinska sea, and round the eastern ocean almost to the river Anadir, whose mouth lies in that ocean almost in 68° N. lat.: the Kuriles inhabit the islands in that sea, reaching as far as those of Japan. The Kamtschatkans have this particular custom, that they endeavour to give every thing a name in their language which may express the property of it; but if they do not understand the thing quite well themselves, then they take a name from some foreign language, which perhaps has no relation to the thing itself; as, for example, they call a priest *bogbog*, because probably they hear him use the word *bogbog*, "God;" bread they call *brightatin angsh*, that is, Russian root; and thus of several other words to which their language is a stranger.

It appears probable, that the Kamtschatkans lived formerly in Mungalia beyond the river Amur, and made one people with the Mungals; which is farther confirmed by the following observations, such as the Kamtschatkan having several words common to the Mungal-Chinese language, as their terminations in ong, ing, oang, chin, cha, ching, kshi, kfung; it would be still a greater proof, if we could show several words and sentences the same in both languages. The Kamtschatkans and Mungals also are both of a middling stature, are swarthy, have black hair, a broad face, a sharp nose, with the eyes falling in, eyebrows small and thin, a hanging belly, slender legs and arms; they are both remarkable for cowardice, boasting, and slavish-

ness to people who use them hard, and for their obstinacy and contempt of those who treat them with gentleness.

Although in outward appearance they resemble the other inhabitants of Siberia, yet the Kamtschatkans differ in this, that their faces are not so long as the other Siberians'; their cheeks stand more out, their teeth are thick, their mouth large, their stature middling, and their shoulders broad, particularly of those people who inhabit the sea-coast.

Before the Russian conquest, they lived in perfect freedom, having no chief, being subject to no law, not paying any taxes; the old men, or those who were remarkable for their bravery, bearing the principal authority in their villages, though none had any right to command or inflict punishment.

Their manner of living is slovenly to the last degree: they never wash their hands or face, nor cut their nails; they eat out of the same dish with the dogs, which they never wash; they never comb their heads, but both men and women plait their hair in two locks, binding the ends with small ropes. When any hair starts out they sew it with threads to make it lie close; by this means they have such a quantity of lice, that they can scrape them off by handfuls, and they are nasty enough even to eat them. Those that have not natural hair sufficient, wear false locks, sometimes as much as weigh 10 pounds, which makes their heads look like a haystack.

They place their chief happiness in idleness, and satisfying their natural lust and appetites; which incline them to singing, dancing, and relating of love-stories; and they think it more eligible to die than to lead a disagreeable life; which opinion often leads them to self-murder. This was so common after the conquest, that the Russians had great difficulty to put a stop to it. They have no notion of riches, fame, or honour; therefore covetousness, ambition, and pride, are unknown among them. On the other hand, they are careless, lustful, and cruel: these vices occasion frequent quarrels and wars among them, sometimes with their neighbours, not from a desire of increasing their power, but from some other causes; such as the carrying off their provisions, or rather their girls, which is frequently practised as the most summary method of procuring a wife. Their trade is almost entirely confined to procuring the immediate necessities and conveniences of life. They sell the Koreki fables, fox and white dog-skins, dried mushrooms, and the like, in exchange for clothes made of deer-skins and other hides. Their domestic trade consists in dogs, boats, dishes, troughs, nets, hemp, yarn, and provisions: and this kind of barter is carried on under a great show of friendship; for, when one wants any thing that another has, he goes freely to visit him, and without any ceremony makes known his wants, although perhaps he never had any acquaintance with him before: the host is obliged to behave according to the custom of the country, and give his guest what he has occasion for; but he may afterwards return the visit, and must be received in the same manner. They fill almost every place in heaven and earth with different spirits, and offer them sacrifices upon every occasion. Some carry little idols about them, or have them placed in their dwellings; but with regard to God, they not only neglect to worship him, but in case of troubles and misfortunes they curse and blaspheme him.

It is very diverting to see them attempt to reckon above ten: for, having reckoned the fingers of both hands, they clasp them together, which signifies ten; then they begin with their toes, and count to twenty; after which they are quite confounded, and cry, *Metcha?* that is, *Where shall I take more?* They reckon ten months in the year, some of which are longer and some shorter; for they do not divide them by the changes of the moon, but by the order of particular occurrences that happen in those regions. They commonly divide our year into two, so that winter is one year and summer another: the sum-

mer year begins in May, and the winter in November. They do not distinguish the days by any particular appellation, nor form them into weeks or months, nor yet know how many days are in the month or year. They mark their epochs by some remarkable thing or other; such as the arrival of the Russians, or the first expedition to Kamtchatka.

If any one kills another, he is to be killed by the relations of the person slain. They burn the hands of people who have been frequently caught in theft; but for the first offence the thief must restore what he hath stolen, and live alone in solitude, without expecting the assistance of others. They never have any disputes about their land or their huts, every one having land and water more than sufficient for his wants. They think themselves the happiest people in the world, and look upon the Russians who are settled among them with contempt. However, this notion begins to change: for the old people, who are confirmed in their customs, drop off; and the young ones, being converted to the Christian religion, adopt the customs of the Russians, and despise the barbarity and superstition of their ancestors.

In every ostrog or large village, by order of her imperial majesty, is appointed a chief, who is sole judge in all causes except those of life and death; and not only those chiefs, but even the common people, have their chapels for worship. Schools are also erected in almost every village, to which the Kamtchatkans send their children with great pleasure: by this means it is to be hoped that barbarity will be in a short time rooted out from amongst them.

Under the name of *ostrog* is understood every habitation consisting of one or more huts, all surrounded by an earthen wall or palisado.—The huts are built in the following manner: They dig a hole in the earth about five feet deep, the breadth and length proportioned to the number of people designed to live in it. In the middle of this hole they plant four thick wooden pillars; over these they lay balks, upon which they form the roof or ceiling, leaving in the middle a square opening, which serves them for a window and chimney; this they cover with grass and earth, so that the outward appearance is like a round hillock; but within they are an oblong square, with the fire in one of the long sides of the square. Between the pillars round the walls of their huts they make benches, upon which each family lies separately; but on that side opposite to the fire there are no benches, it being designed for their kitchen furniture, in which they dress their victuals for themselves and dogs. In those huts where there are no benches, there are balks laid upon the floor, and covered with mats. They adorn the walls of their huts with mats made of grass. They enter their huts by ladders, commonly placed near the fire-hearth; so that, when they are heating their huts, the steps of the ladder become so hot, and the smoke so thick, that it is almost impossible for a stranger to go up or down without being burnt, and even stifled to death: but the natives find no difficulty in it; and though they can only fix their toes on the steps of the ladder, they mount like squirrels; nor do the women hesitate to go through this smoke with their children upon their shoulders, though there is another opening through which the women are allowed to pass; but if any man pretend to do the same, he would be laughed at. The Kamtchatkans live in these huts all the winter, after which they go into others called *balagans*: these serve them not only to live in during the summer, but also for magazines. They are made in the following manner: Nine pillars, about two fathoms long or more, are fixed in the ground, and bound together with balks laid over them, which they cover with rods, and over all lay grass, fastening spars, and a round sharp roof at top, which they cover with bramble, and thatch with grass. They fasten the lower ends of the spars to the balks with ropes and thongs, and have a door on each side, one directly

opposite to the other. They make use of the same kind of huts to keep their fish, &c. till winter comes on, when they can more easily remove it; and this without any guard, only taking away the ladders. If these buildings were not so high, the wild beasts would undoubtedly plunder them; for, notwithstanding all their precaution, the bears sometimes climb up and force their way into their magazines, especially in the time of harvest, when the fish and the berries begin to grow scarce.

The southern Kamtchatkans commonly build their villages in thick woods and other places which are naturally strong, not less than 20 versts from the sea; and their summer habitations are near the mouths of the rivers; but those who live upon the Penschinska sea and the eastern ocean build their villages very near the shore. They look upon that river near which their village is situated as the inheritance of their tribe.

In order to kindle fire, they use a board of dry wood with round holes in the sides of it, and a small round stick; this they rub in a hole till it takes fire; and instead of tinder they use dry grass beat soft. These instruments are held in such esteem by the Kamtchatkans, that they are never without them, and they value them more than our steels and flints; but they are excessively fond of iron instruments, such as hatchets, knives, or needles: nay, at the first arrival of the Russians, a piece of broken iron was looked upon as a great present; and even now they receive it with thankfulness, finding use for the least fragment, either to point their arrows or make darts, which they do by hammering it out cold between two stones. As some of them delight in war, the Russian merchants are forbidden to sell them any warlike instruments: but they are ingenious enough to make spears and arrows out of the iron pots and kettles which they buy; and they are so dexterous, when the eye of a needle breaks, as to make a new eye; which they will repeat until nothing remains but the point.

The Kamtchatkans make their boats of poplar-wood; but the Kuriles, not having any wood of their own, make use of what is thrown on shore by the sea, and is supposed to come from the coasts of Japan, China, or America. The northern inhabitants of Kamtchatka, the settled Koreki, and Tschukotskoi, for want of proper timber and plank, make their boats of the skins of sea-animals. They sew the pieces together with whales' beads, and caulk them with moss or nettles beat small. These boats hold two persons; one of whom sits in the prow, and the other in the stern. They push them against the stream with poles, which is attended with great trouble: when the current is strong, they can scarcely advance two feet in ten minutes; notwithstanding which, they will carry these boats, fully loaded, sometimes 20 versts, and, when the stream is not very strong, even 30 or 40 versts. The larger boats carry 30 or 40 pood; when the goods are not very heavy, they lay them upon a float or bridge resting upon two boats joined together. They use this method in transporting their provisions down the stream, and also to and from the islands.

Their clothes for the most part are made of the skins of deer, dogs, several sea and land animals, and even of the skins of birds; those of different animals being frequently joined in the same garment. They make the upper garment after two fashions; sometimes cutting the skirts all of an equal length, and sometimes leaving them long behind in form of a train, with wide sleeves of a length to come down below the knee, and a hood or caul behind, which in bad weather they put over their heads below their caps. The opening above is only large enough to let their heads pass: they sew the skins of dogs' feet round this opening, with which they cover their faces in cold stormy weather; and round their skirts and sleeves they put a border of white dog-skin; upon their backs they sew the small fureds of skins of different colours. They commonly wear two coats; the under coat with the hair side inwards,

the other side being dyed with alder; and the upper with the hair outwards. For the upper garment they choose black, white, or speckled skins, the hair of which is most esteemed for the beauty of its colour.

Men and women without distinction use the above-mentioned garments; their dress only differing in their under-clothing and in the covering of their feet and legs. The women have an under garment, which they commonly wear at home in the house, consisting of breeches and waistcoat sewed together. The breeches are wide like those of the Dutch skippers, and tie below the knee; the waistcoat is wide above, and drawn round with a string. The summer habits are made of dressed skins without hair: their winter-garment is made of deer or stone-ram skins with the hair on. The undress or household habit of the men is a girdle of leather with a bag before, and likewise a leathern apron to cover them behind; these girdles are sewed with hair of different colours. The Kamtchatkans used formerly to go a-hunting and fishing during the summer in this dress; but now this fashion is changed, and they wear linen shirts, which they buy from the Russians.

The covering of their feet and legs is made of skins of different sorts: in the summer time, during the rains, they wear the skins of seal with the hair outwards; but their most common covering is the skin of the legs of the rein-deer, and sometimes of the legs of other beasts, the shaggiest they can find, to preserve them against the cold. But the buskins which both the Collacs and Kamtchatkans use in their finest dress, are made in the following manner: The sole is of white seal skin, the upper part of white fine leather, the hind quarters of white dog-skin; what comes round the legs is of dressed leather or dyed seal-skin; the upper parts are embroidered. These buskins are so extraordinary, that if a bachelor is observed to wear them, he is immediately concluded to be upon a scheme of courtship.

They wear the same sort of caps as the people of Yakutski. In summer they have a sort of hats of birch bark tied about their head. The Kuriles use in the summer-time caps made of plaited grass. The women's head-dress is the perukes that we formerly mentioned; and these were so dear to them, that when they came to be Christians they were with difficulty prevailed upon to quit this dress for one more decent: however, at present, round the Russ settlements all is entirely changed, the women wearing shirts, ruffles, waistcoats, caps, and ribbands; which change nobody now complains of except the very old people. The women do all their work in mittens; they formerly never washed their faces, but now they use both white and red paint: for white paint they make use of a rotten wood; and for red a sea plant, which they boil in seal's fat, and, rubbing their cheeks with it, make them very red. They dress most in the winter time, especially when they either receive or pay visits.

The common clothes for a Kamtchatkan and his family will not cost him less than 100 rubles; for the coarsest worsted stockings, which cost in Russia 20 kopeeks, cannot be bought here for less than a ruble; and all other things are sold in the same proportion. The Kuriles are more able to buy good clothes than the Kamtchatkans; for they can purchase for one sea-beaver as much as the Kamtchatkans can for twenty foxes; and one beaver costs the Kuriles no more trouble than five foxes do the Kamtchatkans; for he must be a good hunter who catches more than ten foxes in the winter; and a Kurile thinks himself unlucky if he doth not catch three beavers in the season; besides which, great numbers are thrown upon the shore by storms.

The Kamtchatkans divide their fish into six parts: the sides and tail are hung up to dry; the back and thinner part of the belly are prepared apart, and generally dried over the fire; the head is laid to sour in pits, and then they eat it like salt fish,

and esteem it much, though the stink is such that a stranger cannot bear it; the ribs and the flesh which remain upon them they hang up and dry, and afterwards pound for use; the larger bones they likewise dry for food for their dogs: in this manner all these different people prepare the yokola, which is the principal food, or, one may say, household bread; and they eat it for the most part dry.

Their second favourite food is caviar, or the roes of fish, which they prepare three different ways. They dry the roe whole in the air; or take it out of the skin which envelops it, and, spreading it upon a bed of grass, dry it before the fire; or, lastly, make rolls of it with the leaves of grass, which they also dry. They never take a journey or go to hunting without dry caviar; and if a Kamtchatkan has a pound of this, he can subsist without any other provision a great while: for every birch and alder tree furnishes him with bark, which with his dried caviar makes him an agreeable meal; but they cannot eat either separately, for the caviar sticks like glue to the teeth; and it is almost impossible to swallow the bark chewed ever so long by itself. There is still a fourth method, which both Kamtchatkans and Koreki use in preparing their caviar: the first having covered the bottom of a pit with grass, they throw the fresh caviar into it, and leave it there to grow sour: the Koreki tie theirs in bags, and leave it to sour; this is esteemed their most delicate dish.

There is a third sort of diet, called by the Kamtchatkans *chupriki*, which is prepared in this manner: In their huts, over the fire-place, they make a bridge of stakes, upon which they lay a heap of fish, which remains there until the hut becomes as warm as a bagnio. If there is no great thickness of fish, one fire serves to dress it; but sometimes they are obliged to make two, three, or more fires. Fish dressed in this manner is half roasted, half smoked, but has a very agreeable taste, and may be reckoned the best of all the Kamtchatkan cookery: for the whole juice and fat is prepared with a gradual heat, and kept in by the skin, from which they may when done enough be easily separated; and as soon as it is thus dressed, they take out the guts, and spread the body upon a mat to dry: this they afterwards break small, and, putting it into bags, carry it along with them for provision, eating it like the yokola.

The Kamtchatkans have a dish which they esteem very much, called *kuigul*: it is fish laid to grow sour in pits; and though the smell of it is intolerable, yet the Kamtchatkans esteem it a perfume. This fish sometimes rots so much in the pits, that they cannot take it out without ladles; in which case indeed they use it for feeding their dogs.

As for the flesh of land and the larger sea animals, they boil it in their troughs with several different herbs and roots; the broth they drink out of ladles and bowls, and the meat they take out upon boards, and eat in their hands. The whale and sea-horse fat they also boil with roots.

There is a principal dish at all their feasts and entertainments, called *selaga*, which they make by pounding all sorts of different roots and berries, with the addition of caviar and of whale and seal's fat.

Before the conquest, they seldom used any thing for drink but plain water, unless when they made merry; then they drank water which had stood some time upon mushrooms. At present they drink spirits as fast as the Russians. After dinner they drink water; and, when they go to bed at night, set a vessel of water by them, with the addition of snow or ice to keep it cold, and always drink it up before morning. In the winter-time, they amuse themselves frequently by throwing handfuls of snow into their mouths: and the bridegrooms, who work with the fathers of their future brides, find it their hardest task to provide snow for the family in summer-time; for they must bring it from the highest hills, be the weather what it will, otherwise they would never be forgiven.

The Kamtchatkans commonly travel in sledges drawn by dogs. The animals used for this purpose differ very little from the common house-dogs; they are of a middling size, of various colours, though there seem to be more white, black, and grey, than of any other. In travelling, they make use of those that are castrated, and generally yoke four to a sledge. They drive and direct their dogs with a crooked stick about four feet long, which they sometimes adorn with different-coloured thongs; this is looked upon as a great piece of finery. They drive the sledge sitting upon the right side, with their feet hanging down; for it would be looked upon as a disgrace for a man to sit down at the bottom of the sledge, or to make use of any person to drive him, nobody doing this but the women. It is very difficult to travel in these sledges; for, unless a man keeps the exactest balance, he is liable every moment from the height and narrowness of them to be overturned: in a rugged road this would be very dangerous, as the dogs never stop till they come to some house, or are entangled by something upon the road; especially in going down steep hills, when they run with all their force, and are scarcely to be kept in; for which reason, in descending any great declivity, they unyoke all the dogs except one, and lead them softly down. They likewise walk up hills; for it is as much as the dogs can do to drag up the sledge empty. After a deep snow, before it has been hardened by a frost, there is no travelling with dogs till a road be made, which is effected by a man going before upon snow-shoes, whom they call *brodovshika*. The snow-shoes are made of two thin boards, separated in the middle, bound together at the ends, and with the fore part bent a little upwards. The *brodovshika*, having one of these shoes upon each foot, leaves the dogs and sledge, and going on clears the road for some way; then returning, leads forward the dogs and sledge so far as the road is made; a method which he must continue till he comes to some dwelling-house. This is very laborious; and it happens so often, that no driver ever sets out without his snow-shoes. When a storm of driven snow surprises them, they are obliged with all haste to seek the shelter of some wood, and stay there as long as the tempest lasts, which sometimes is a whole week. If they are a large company, they dig a place for themselves under the snow, and cover the entry with wood or brambles. Sometimes they hide themselves in caves or holes of the earth, wrapping themselves up in their furs; and when thus covered, they move or turn themselves with the greatest caution lest they should throw off the snow, for under that they lie as warm as in their common huts: they only require a breathing-place; but their clothes must not be tight or hard-girt about them, for then the cold is insufferable. Another danger attending travellers is, that in the severest frost several rivers are not quite frozen over: and as the roads for the most part lie close upon the rivers, the banks being very steep, scarce a year passes without many being drowned. A disagreeable circumstance also, to those who travel in these parts, is their sometimes being obliged to pass through copses, where they run the risk of having their eyes scratched out or their limbs broken; for the dogs always run most violently in the worst roads, and, to free themselves, very often overturn their driver. The best travelling is in the month of March or April, when the snow is turned hard or frozen a little at top: however, there is still this inconvenience attending it, that sometimes travellers are obliged to lodge two or three nights in desert places; and it is difficult to prevail upon the Kamtchatkans to make a fire either for warming themselves or dressing victuals, as they and their dogs eat dried fish, and find themselves so warm wrapped in their furs, that they want no other heat; nay, all the people of this climate bear cold so well, that they sleep in the open air as sound as others in a warm bed, and awake next morning perfectly refreshed and alert. This seems to be so natural to all here, that some of them have been

seen to lie down with their backs uncovered against a fire; and notwithstanding the fire has been burnt out long before morning, they continued to sleep on very comfortably, and without any inconvenience.

Islands in the Sea of KAMTCHATKA. So many of these have been discovered by the Russians, that the existence of almost a continued chain of islands between the continents of Asia and America is now rendered extremely probable. Many further discoveries of great importance to science, however, remain yet to be made. The principal islands already known are the Kuril isles, which stretch south-west towards the coasts of China or Japan, and are almost uninhabited; those called *Beering's*, and *Copper islands*, the Aleutian isles, and Fox-islands, or *Iyssié Ostrava*, lie almost directly east, stretching nearly to 230° of longitude east from Ferro. The first project of making discoveries in that tempestuous sea which lies between Kamtchatka and America was set on foot by Peter the Great of Russia. Captains Beering and Titirikoff were employed in the undertaking; the former of whom was shipwrecked and died on the island which is still called by his name. As this lies at no great distance from Kamtchatka, the inhabitants of the latter soon ventured over to it, as the sea otters and other animals of that kind were accustomed to resort thither in great numbers.

Mednoi Ostraff, or *Copper-island*, which lies in full sight of Beering's island, was next visited. This island has its name from the great quantity of copper with which the north-east coast of it abounds, the only side which is known to the Russians. It is washed up by the sea, and covers the shores in such abundance that many ships might be loaded with it. Perhaps an India trader might make a profitable voyage from thence to China, where this metal is in high demand. This copper is mostly in a metallic or malleable state, and many pieces seem as if they had formerly been in fusion. The island is not high; but has many hillocks, each of which has the appearance of having formerly been a volcano. With this kind of hillocks all the islands in the sea of Kamtchatka abound, insomuch that not a single island, though ever so small, was found without one; and many of them consisted of nothing else. In short, all the chain of islands above mentioned may without any stretch of imagination be considered as thrown up by some late volcanoes. The apparent novelty of every thing seems to justify this conjecture: nor can any objection be derived from the vegetable productions with which these islands abound; for the summer after the lower district of Zutphen in Holland was gained from the sea, it was covered over with wild mustard.—All these islands are subject to frequent and violent earthquakes, and abound in sulphur. We are not informed whether any lava is found upon them; but a parti-coloured stone as heavy as iron, probably a lava, is mentioned as being found there. From this account, it is by no means improbable that the copper above mentioned has been melted in some eruption.

Beering's island is situated due east from Kamtchatka, in the 185^{th} degree of longitude; and Copper-island about one degree more to the eastward, and in the latitude of 54° north. The former is from 70 to 80 versts long, and stretches from north-west to south-east in the same direction as Copper-island. The latter is about 50 versts in length. About 300 versts east-by-south of Copper-island lie the Aleutian isles; of which *Atak* is the nearest: it is rather larger than Beering's island, and stretches from west to south-east. From thence about 20 versts eastwards is situated *Semitshi*, extending from west to east; and near its extremity is another small island. To the south of the strait which separates the two latter islands, and at the distance of 40 versts from both of them, lies *Shimiya* in a similar position, and not above 25 versts in length. All these islands lie between 54 and 55 degrees of north latitude.

The *Fox-islands* are situated east-north-east from the Aleu-

tians: the nearest of these, Atchak, is about 800 versts distant; it lies in 56° north latitude, and extends from west-south-west towards east-north-east. It greatly resembles Copper-island, and is provided with a commodious harbour on the north. From thence all the other islands of this chain stretch in a direction towards N. E. by E. The next to Atchak is Amlak, and about 15 versts distant; it is nearly of the same size, and has an harbour on its south side. Next follows Saugaganak, at about the same distance, but somewhat smaller; from thence is 50 versts to Amuchta, a small rocky island; and the latter to Yunakfan, another small island. About 20 versts from Yunakfan there is a cluster of five small islands, or rather mountains, Kigalgist, Kagamila, Tfigulac, Ulaga, and Tana-Unok; and which are therefore called by the Russians *Pat Sopki*, or the Five Mountains. Of these Tana-Unok lies most to the north-east, towards which the western point of Umnak advances within the distance of 20 versts.

Umnak stretches from south-west to north-east; it is 150 versts in length, and has a very considerable bay on the west end of the northern coast, in which there is a small island, or rock, called *Adugak*; and on the south side *Shemalga*, another rock. The western point of *Aghunalashka*, or *Unalashka*, is separated from the east end of *Umnak* by a strait near 20 versts in breadth. The position of these two islands is similar; but *Aghunalashka* is much the largest, and is above 200 versts long. It is divided towards the north-east into three promontories, one of which runs out in a westerly direction, forming one side of a large bay on the north coast of the island: the second stretches out north-east, ends in three points, and is connected with the island by a small neck of land. The third, or most southerly one, is separated from the last-mentioned promontory by a deep bay. Near *Unalashka* towards the east lies another small island called *Shirkin*. About 20 versts from the north-east promontory of *Aghunalashka* lie four islands: the first, *Akutan*, is about half as big as *Umnak*; a verst further is the small island *Akun*: a little beyond is *Akunok*; and lastly *Kigalga*, which is the smallest of these four; and stretches with *Akun* and *Akunok* almost from north to south. *Kigalga* is situated about the 61st degree of latitude. About 100 versts from thence lies an island called *Unimak*, upon which a Russian navigator (Captain *Krenitzin*) wintered; and beyond it the inhabitants said there was a large tract of country called *Alashka*, of which they did not know the boundaries.

The Fox-islands are in general very rocky, without containing any remarkably high mountains: they are destitute of wood; but abound in rivulets and lakes, which are mostly without fish. The winter is much milder than in Siberia: the snow seldom falls before the beginning of January, and continues on the ground till the end of March. There is a volcano in *Amuchta*, and sulphur is produced on another island; in some others are springs hot enough to boil provisions. Sulphureous flames also are sometimes seen at night upon the mountains of *Unalashka* and *Akutan*.

The Fox-islands are tolerably populous in proportion to their size. The inhabitants are entirely free, and pay tribute to no one; they are of a middle stature, and live, both in summer and winter, in holes dug in the earth. No signs of religion were found among them. Several persons indeed pass for sorcerers, pretending to know things past and to come; and are accordingly held in high esteem, but without receiving any emolument. Filial duty and respect towards the aged are not held in estimation by these islanders. They are not, however, deficient in fidelity towards each other; they are of a lively and cheerful temper, though rather impetuous, and naturally prone to anger. In general, they do not observe any rules of decency; but follow all the calls of nature publicly and without the least reserve. Their principal food consists in fish, and other sea-an-

mals, small shell-fish, and sea plants; their greatest delicacies are wild lilies and other roots, together with different kinds of berries. When they have laid in a store of provisions, they eat at any time of the day without distinction; but in case of necessity, they are capable of fasting several days together. They seldom heat their dwellings: but when they are desirous of warming themselves, they light a bundle of hay, and stand over it; or else they set fire to train-oil, which they pour into a hollow stone. They feed their children when very young with the coarsest flesh, and for the most part raw. If an infant cries, the mother immediately carries it to the sea-side, and, be it summer or winter, holds it naked in the water until it is quiet. This custom, it is said, is so far from doing the children any harm, that it hardens them against the cold; and accordingly they go barefooted through the winter without the least inconvenience. They are also trained to bathe frequently in the sea; and it is an opinion generally received among the islanders, that by these means they are rendered bold and fortunate in fishing.

The men wear shirts made of the skins of cormorants, sea-divers, and gulls; and, in order to keep out the rain, they have upper garments of the bladders and other intestines of sea-lions, sea-calves, and whales, blown up and dried. They cut their hair in a circular form quite close to their ears; and have also a round place on the top. The women, on the contrary, let the hair descend over the forehead as low as the eye-brows, and tie the remaining part in a knot upon the top of the head. They pierce the ears, and hang in them bits of coral, which they get from the Russians. Both sexes make holes in the gristle of the nose, and in the under lip, in which they thrust pieces of bone, and are very fond of such kind of ornaments. They mark also and colour their faces with different figures. They barter among one another sea-otters, sea-bears, clothes made of birds skins and of dried intestines, skins of sea-lions and sea-calves for the coverings of their canoes, wooden masks, darts, thread made of sinews and hair of rein-deer.

Their household utensils are square pitchers or large troughs, which they make out of the wood driven ashore by the sea. Their weapons are bows and arrows pointed with flint, and javelins of two yards in length, which they throw from a small board. Instead of hatchets, they use crooked knives of flint or bone. Some iron knives, hatchets, and lances, were observed among them, which they had probably got by plundering the Russians.

According to the reports of the oldest inhabitants of *Umnak* and *Unalashka*, they have never been engaged in any war, either amongst themselves or with their neighbours; except with the people of *Alashka*, the occasion of which was as follows: The son of the toigon or chief of *Umnak* had a maimed hand; and some inhabitants of *Alashka*, who came to visit upon that island, fastened to his arm a drum, out of mockery, and invited him to dance. The parents and relations of the boy were offended at this insult: hence a quarrel ensued; and from that time the people have lived in continual enmity, attacking and plundering each other by turns. According to the reports of the islanders, there are mountains upon *Alashka*, and woods of great extent at some distance from the coast. The natives wear clothes made of the skins of rein-deer, wolves, and foxes; and are not tributary to any of their neighbours. The inhabitants of the Fox-islands seem to have no knowledge of any country beyond *Alashka*, which is one of the most easterly islands yet discovered in these seas, and is probably not far distant from the continent of America.

Festivals are very common among these islanders; and more particularly when the inhabitants of one island are visited by those of the others. The men of the village meet their guests, beating drums, and preceded by the women, who sing and

dance. At the conclusion of the dance, the hosts invite them to partake of the feasts; after which ceremony the former return first to their dwellings, place mats in order, and serve up their best provision. The guests next enter, take their places, and, after they are satisfied, the diversions begin. First, the children dance and caper, at the same time making a noise with their small drums, while the owners of the huts of both sexes sing. Next, the men dance almost naked, tripping after one another, and beating drums of a larger size: when these are weary, they are relieved by the women, who dance in their clothes, the men continuing in the mean time to sing and beat their drums. At last the fire is put out which had been kindled for the ceremony. The manner of obtaining fire is by rubbing two pieces of dry wood against each other, or most commonly by striking two flints together, and letting the sparks fall upon some sea-otter's hair mixed with sulphur. If any forcerer is present, it is then his turn to play his tricks in the dark; if not, the guests immediately retire to their huts, which are made, on that occasion, of their canoes and mats. The natives who have several wives do not withhold them from their guests; but where the owner of a hut has himself but one wife, he then makes the offer of a female servant.

Their hunting season is principally from the end of October to the beginning of December; during which time they kill great numbers of young sea bears for their clothing. They pass all December in feasting and diversions similar to those above mentioned; with this difference, however, that the men dance in wooden masks representing various sea-animals, and painted red, green, or black, with coarse coloured earths found upon these islands.

During these festivals, they visit each other from village to village, and from island to island. The feasts concluded, masks and drums are broken to pieces, or deposited in caverns among the rocks, and never afterwards made use of. In spring, they go out to kill old sea-bears, sea-lions, and whales. During summer, and even in winter when it is calm, they row out to sea, and catch cod and other fish. Their hooks are of bone; and for lines they make use of a string made of a long tenacious sea-weed, which is sometimes found in those seas near 160 yards in length.

Whenever they are wounded in any encounter, or bruised by any accident, they apply a sort of yellow root to the wound, and fast for some time. When their head aches, they open a vein in that part with a stone-lancet. When they want to glue the points of their arrows to the shafts, they strike their nose till it bleeds, and use the blood to prepare glue.

Murder is not punished among them; for they have no judge. The following ceremonies are used in the burial of the dead. The bodies of poor people are wrapped up in their own clothes, or in mats; then laid in a grave, and covered over with earth. The bodies of the rich are put, together with their clothes and arms, in a small boat made of the wood driven ashore by the sea: this boat is hung upon poles placed crosswise; and the body is thus left to rot in the open air.

The customs and manners of the inhabitants of the Aleutian isles are nearly similar to those of the inhabitants of the Fox-islands. The former indeed are rendered tributary and entirely subject to Russia; and most of them have a slight acquaintance with the Russian language, which they have learned from the crews of the different vessels who have landed there.

KAN, or KHAN, the name of an officer in Persia, answering to that of governor in Europe. There are kans of provinces, countries, and cities, who have different additions to distinguish them.

KANEM, a city of Africa, in the empire of Bornou, capital of an extensive and fertile province of the same name, in which the inhabitants, who are composed of Mussulmans and Pagans,

breed multitudes of cattle, and raise a number of horses for the service of the king. It is 150 miles N. W. by N. of Bornou.

KANGUROO. See DIDELPHIS.

KANIOW, a strong town of Poland, in the Ukraine, and in the palatinate of Kiow. It is near the river Dnieper, 62 miles S. by E. of Kiow, and 100 N. E. of Bracklaw.

KANISCA, a strong town of Lower Hungary, capital of the county of Salawar. It was taken by the Imperialists in 1690, and is seated on the river Drave, 54 miles S. W. of Alba Regalis, and 100 S. by E. of Vienna. E. lon. 17. 40. N. lat. 46. 43.

KAN-TCHEOU-FOU, a flourishing town of China, in the province of Kiang-si. Its rivers, port, riches, and population, all contribute to attract strangers. A day's journey from this city is a very rapid current, almost 20 leagues in length, which flows with great impetuosity over a number of scattered rocks that are level with the water. Travellers here are in great danger of being lost, unless they take care to be conducted by one of the pilots of the country: after this passage, the river becomes twice as large as the Seine at Rouen; it is continually covered with loaded barks and other vessels under sail. Near the walls of the city is a very long bridge, composed of 130 boats joined together by strong iron chains. The custom-house is upon this bridge, where a receiver constantly resides to visit all barks, and examine if they have paid the duties imposed on the commodities with which they are loaded. Two or three moveable boats are so placed, that by their means the bridge can be opened or shut, to give or refuse a passage; and no barks are ever permitted to pass until they have been examined. In the territory belonging to this city, grow a great number of those valuable trees from which varnish distils. Its district is extensive, and contains 12 cities of the third class.

KAOLIN, the name of an earth which is used as one of the two ingredients in oriental porcelain. Some of this earth was brought from China, and examined by Mr. Reaumur. He found that it was perfectly infusible by fire, and believed that it is a talky earth; but Mr. Macquer observes, that it is more probably of an argillaceous nature, from its forming a tenacious paste with the other ingredient called *petunse*, which has no tenacity. Mr. Bomare says, that by analysing some Chinese kaolin, he found it was a compound earth consisting of clay, to which it owed its tenacity; of calcareous earth, which gave it a mealy appearance; of sparkling crystals of mica; and of small gravel, or particles of quartz-crystals. He says, that he has found a similar earth upon a stratum of granite, and conjectures that it may be a decomposed granite. This conjecture is the more probable, as kaolins are frequently found in the neighbourhood of granites. See PORCELAIN.

KAOU'CHOUK. See CAOUTCHOUC.

KAPOSWAR, a fort of Lower Hungary, so called from the river Kapos, that washes its walls. It is 55 miles W. of Tolaa. E. lon. 18. 13. N. lat. 46. 31.

KARAITES. See CARAITES.

KARAT. See CARACT.

KARECK, an island in the Persian Gulph, subject to the Dutch. It was visited by Mr. Ives in 1758. He found the south part of the island well cultivated, with agreeable fields of corn, and producing plenty of esculent vegetables. In the middle are very high hills abounding with a variety of shells. Some fragments torn from their files afforded an opportunity of observing an immense quantity of oysters, scallop, cockle, and other shells. The common tree here is the banian, but without those luxuriant shoots, which in some other places go downward and take root in the ground. The lavender-cotton is also found here; and the island abounds with fowl of various kinds. Pearl-oysters are also found here, but lie at considerable depths. Mr. Ives mentions one pearl of considerable size, which had upon it

a natural representation of the face of a human fœtus in the early months of pregnancy.

This settlement was founded by Baron Kniphausen, brother to one of that name some time ago ambassador at the court of London. Having left the Prussian service on some disgust, he entered into that of France. He afterwards went to the East Indies, and was appointed resident to the Dutch factory at Bassora. Here he became an object to the avarice and rapacity of the Turkish governor; who having got him accused of capital crimes, he was at last glad to compound with them for 50,000 rupees, the whole sum he was worth, besides giving directions how they might squeeze other 50,000 from his successor in office (who in truth wished him turned out) and the banian who did the business of the Dutch factory, and who had likewise been concerned in underhand practices against him.

The new resident was overjoyed at his accession, but lost all patience when he found himself obliged to pay 30,000 rupees to the governor as a compliment on his entering into a post of such consequence. Nor had the banian much better reason to be satisfied, being obliged to pay down 20,000 rupees to make up the sum which was to satisfy the rapacity of the governor.

Baron Kniphausen sailed from Bassora the very day after he was set at liberty; but having landed on this island, he, in conjunction with an Arabian sheick, formed the plan of the settlement. He then carried a letter from the sheick to the governor and council of Batavia, in which the former proposed to give up the sovereignty of the island. Before setting out for this place, however, the baron took care to dispatch a messenger across the desert to Constantinople, acquainting the Dutch ambassador with the treatment he had received, and requesting liberty of the grand vizir for the Dutch to settle at Kareck. The messenger returned with a favourable answer before the baron came back from Batavia. The governor of Bassora, then, having attempted in vain to persuade him to return to that place, wrote a letter of complaint to Batavia, accusing the baron in terms of the utmost exaggeration, but without any mention of the 100,000 rupees. The baron, however, having got intelligence of this proceeding, used such diligence that he got back to Batavia in the very ship which carried the letter. Being thus present on the spot to answer the charges brought against him, he acquitted himself so well that his scheme was instantly approved of, and he was sent back with two ships and 50 men to take possession of Kareck, whose inhabitants at that time amounted to no more than 100 poor fishermen.

Considerable difficulties now occurred in the establishment of the new colony; for he had but very few materials with him, and the government of Batavia was very slow in sending him the succours they had promised. He was therefore obliged to send for workmen from Persia and Arabia, with whose assistance he built a small compact fort, strong enough to defend itself against any of the country powers and any ships usually sailing to India, excepting those of our East India company. Nor was he content with putting himself in a posture of defence, but even commenced hostilities against the Turks; and by detaining two vessels very richly laden, which happened to touch at the island, he at last obliged the governor of Bassora to pay back the 100,000 rupees he had extorted, 30,000 of which he restored to his successor in office at Bassora, and 20,000 to the banian. When Mr. Ives visited him, he informs us, that surprising progress had been made during the little time the baron had held the sovereignty of the island, and that he intended to make it a strong and wealthy place; at the same time that he discovered his taste for literature by advancing a sum of money for books and instruments of various kinds, which were afterwards punctually sent. After that time, however, the baron quitted the service of the Dutch; and the island is again in possession of the sheick of Bundaric, to whom it formerly belonged. It is about

five miles long and two in breadth; lying nearly in the middle of the Persian Gulf, about seven leagues from each side, and about 30 leagues from the mouth of Bassora river, where all ships bound to that port must call for pilots.

KARLE, a Saxon word used in our law, sometimes simply for a man; and sometimes, with an addition, for a servant or clown. Thus the Saxons call a seaman *buscarle*, and a domestic servant *huscarle*. From hence comes the modern word *churl*.

KARLSRUH, a handsome town of Germany, in the circle of Suabia, and territory of the margrave of Baden Durlach, who has here a magnificent palace. The town is built on a regular plan, and the houses are all as uniform as the streets. It is 12 miles N. by E. of Baden.

KARMATIANS, a sect of Mohammedans, who once occasioned great disorders in the empire of the Arabs.

KASAN, a large country of the Russian empire, lying on both sides of the river Volga. It was formerly an independent kingdom, subject to the Kalmuc Tartars, to whom the Great Dukes of Moscow, with the other petty principalities of Russia, were tributary. But Ivan Vassilievitch I. the founder of the Russian greatness, toward the end of the 15th century rescued his country from the Tartar yoke; and in 1552 the second duke of the same name conquered Kasan, which now forms the three Russian governments of Kasan, Simbirsk, and Penza.

KASAN, the capital of the Russian government of the same name, seated on the rivulet Casanka, where it falls into the Volga. It is 414 miles E. by N. of Moscow. E. lon. 49. 35. N. lat. 55. 23.

KASTRIL, or KESTRIL. See FALCO.

KATTEGATTE, a noted sea lying between part of Jutland and the coast of Sweden, and towards the latter covered with a great number of isles. It is almost closed at the extremity by the low Danish islands of Sealand and Funen, which had in old times been (with Sweden) the seat of the Suiones. Between the first and the coast of Sweden is the famous sound, the passage tributary to the Danes by thousands of ships. These islands were of old called *Codonania*, and gave to the Kattegatte the name of *Sinus Codanus*. Its greatest depth is 35 fathoms. It decreases as it approaches the sound; which begins with 16 fathoms, and near Copenhagen shallows even to four. The Roman fleet, under the command of Germanicus, failed, according to Pliny, round Germany, and even doubled the *Cimbricum Promontorium*, and arrived at the islands which fill the bottom of the Kattegatte: either by observation or information, the Romans were acquainted with 23. One they called *Glossaria*, from its amber, a fossil abundant to this day on part of the south side of the Baltic. A Roman knight was employed by Nero's master of the gladiators to collect in these parts that precious production, by which he became perfectly acquainted with this country.

KAUFFBEUREN, a free and imperial town of Germany, in the circle of Suabia and territory of Kempten. The inhabitants consist of Papists and Protestants. It is seated on the river Wardach, 18 miles N. E. of Kempten, and 30 S. by W. of Augsburg. E. lon. 10. 43. N. lat. 47. 58.

KAY, QUAY, or Key. See KEY.

KAYE'S-ISLAND, an island in the North Pacific Ocean, whose south-west point is a naked rock, considerably elevated above the land within it. Some parts of the shore are interrupted by small valleys filled with pine-trees. These also abound in other parts of the island, which indeed is covered, in a manner, with a broad girdle of wood. The trees, however, are far from being of an extraordinary growth; so that they would be of no great service for shipping, excepting as materials for small things. The pine-trees appear to be all of one species; and neither the Canadian pine, nor cypress, was to be

seen. This island, which was discovered by captain Cook in 1778, lies in W. lon. 131. 48. and N. lat. 59. 51.

KAYSERSBERG, a town of France, in the department of Upper Rhine and late province of Alsace, five miles N. W. of Colmar, and 25 N. W. of Basle. E. lon. 7. 25. N. lat. 48. 10.

KAYSERSLAUTERN, a town of Germany, in the Lower Palatinate, belonging to the Elector Palatine; seated on the river Lauter, 22 miles S. W. of Worms, and 38 S. by W. of Mentz. E. lon. 7. 51. N. lat. 49. 20.

KAYSARSTHUL, or KEISERSTOUL, a town of Switzerland, in the county of Baden, with a bridge over the Rhine, and a castle. It belongs to the bishop of Constance, and is eight miles S. E. of Zurzach. E. lon. 8. 24. N. lat. 47. 8.

KAYSERVERD, or KEISERTWERT, a town of Germany, in the circle of Westphalia and duchy of Berg, subject to the Elector Palatine. The fortifications are demolished. It is seated on the Rhine, eight miles N. of Dusseldorp, and 22 N. W. of Cologne. E. lon. 6. 45. N. lat. 51. 14.

KAZY, in the East Indies, a Mahometan judge or magistrate; appointed originally by the court of Delhi to administer justice according to their written law; but particularly in matters relative to marriages, the sales of houses, and transgressions of the Koran. He attests or authenticates writings, which under his seal are admitted as the originals in proof.

KEBLA, an appellation given by the Mahometans to that part of the world where the temple of Mecca is situated, towards which they are obliged to turn themselves when they pray.

KECKERMAN (BARTHOLOMEW), a native of Dantzick, and professor of philosophy there about the beginning of the 17th century, composed systems of almost all the sciences, in which he shews more method than genius. He died in 1609, fairly worn out at the age of 38 with mere scholastic drudgery.

KEDAR, in ancient geography, a district in the desert of the Saracens (so called from Cedar, the son of Ishmael, according to Jerome, who in another place says that Kedar was uninhabitable), on the north of Arabia Felix. *Kedareni*, the people, who dwelt in tents like the other Seenites (Psalm cxx.), were rich in cattle (Isaiah lx.), of a swarthy complexion (Canticles i.), and excellent at the bow (Isaiah xxi.).

KEDES, in ancient geography, a city of refuge and Levitical in the tribe of Naphthali, on the confines of Tyre and Galilee (Josephus). Jerome calls it a sacerdotal city, situated on a mountain 20 miles from Tyre, near Paneas, and called *Ciddissus*, taken by the king of Assyria. Another *Kedes* in the tribe of Issachar (1 Chron. vii. 72.), which seems to be called *Kislon* (Joshua xix.).

KEDGE, a small anchor, used to keep a ship steady whilst she rides in a harbour or river, particularly at the turn of the tide, when she might otherwise drive over her principal anchor, and entangle the stock or flukes with her slack cable, so as to loosen it from the ground. This is accordingly prevented by a kedge rope that hinders her from approaching it. The kedges are particularly useful in transporting a ship: i. e. removing her from one part of the harbour to another, by means of ropes which are fastened to these anchors. They are generally furnished with an iron stock, which is easily displaced for the convenience of stowing them.

KEDRON, or CEDRON, in ancient geography, a town which, from the defeat and pursuit of the Syrians (1 Mac. xvi.), appears to have stood on the road which led from the Higher India to Azotus: in that war it was burnt by the Jews.

KEDRON, or *Cedron*, in ancient geography. St. John calls it a brook, but Josephus a deep valley between Jerusalem and Mount Olivet to the east; called also *Kedron* from its blackness.

A brook only in winter, or in rainy weather, according to Maundrel.

KEEL, the principal piece of timber in a ship, which is usually first laid on the stocks in building. If we compare the carcase of a ship to the skeleton of the human body, the keel may be considered as the backbone, and the timbers as the ribs. It therefore supports and unites the whole fabric, since the stem and stern-post, which are elevated on its ends, are in some measure a continuation of the keel, and serve to connect and inclose the extremities of the sides by transoms; as the keel forms and unites the bottom by timbers. The keel is generally composed of several thick pieces placed lengthways, which, after being scarfed together, are bolted, and clenched upon the upper side. When these pieces cannot be procured large enough to afford a sufficient depth to the keel, there is a strong thick piece of timber bolted to the bottom thereof, called the *false keel*, which is also very useful in preserving the lower side of the main keel. In our largest ships of war, the false keel is generally composed of two pieces, which are called the *upper* and the *lower false keels*. See *MIDSHIP-Frame*. The lowest plank in a ship's bottom, called the *garboard-streak*, has its inner edge let into a groove or channel cut longitudinally on the side of the keel: the depth of this channel is therefore regulated by the thickness of the garboard-streak.

KEEL is also a name given to a low flat-bottomed vessel, used in the river Tyne to bring the coals down from Newcastle and the adjacent parts, in order to load the colliers for transportation.

KEEL-Hauling, a punishment inflicted for various offences in the Dutch navy. It is performed by plunging the delinquent repeatedly under the ship's bottom on one side, and hoisting him up on the other, after having passed under the keel. The blocks or pulleys by which he is suspended are fastened to the opposite extremities of the main yard, and a weight of lead or iron is hung upon his legs, to sink him to a competent depth. By this apparatus he is drawn close up to the yard-arm, and thence let fall suddenly into the sea, where, passing under the ship's bottom, he is hoisted up on the opposite side of the vessel. As this extraordinary sentence is executed with a serenity of temper peculiar to the Dutch, the culprit is allowed sufficient intervals to recover the sense of pain, of which indeed he is frequently deprived during the operation. In truth, a temporary insensibility to his sufferings ought by no means to be construed into a disrespect of his judges, when we consider that this judgment is supposed to have peculiar propriety in the depth of winter, whilst the flakes of ice are floating on the stream; and that it is continued till the culprit is almost suffocated for want of air, benumbed with the cold of the water, or stunned with the blows his head receives by striking the ship's bottom.

KEELSON, a piece of timber which may be properly defined the interior or counter-part of the keel; as it is laid upon the middle of the floor-timbers, immediately over the keel, and like it composed of several pieces scarfed together. In order to fit with more security upon the floor timbers and crotches, it is notched about an inch and a half deep, opposite to each of those pieces, and thereby firmly scored down upon them to that depth, where it is secured by spike nails. The pieces of which it is formed are only half the breadth and thickness of those of the keel. The keelson serves to bind and unite the floor timbers to the keel. It is confined to the keel by long bolts, which, being driven from without through several of the timbers, are fore-locked or clenched upon rings on the upper side of the keelson.

KEEPER OF THE GREAT SEAL, is a lord by his office, and styled *lord keeper of the great seal of Great Britain*; he is always one of the privy-council. All grants, charters, and commissions of the king under the great seal pass through the hands

of the lord-keeper; for without that seal many of those grants, &c. would be of no force. The king being, in the interpretation of the law, a corporation, he therefore passes nothing but by the great seal, which is also said to be the public faith of the kingdom, being in the highest esteem and reputation. Whenever there is a lord-keeper, he is invested with the same place, authority, pre-eminence, jurisdiction, or execution of laws, as the lord chancellor of Great Britain is vested with. The lord-keeper is constituted by the delivery of the great seal, &c.

KEEPER of the Privy seal, is also a lord by his office, through whose hands all grants, pardons, &c. pass before they come to the great seal; and even some things pass his hands which do not pass the great seal at all. This officer is also one of the privy-council, yet was anciently called *clerk of the privy seal*. His duty is to put the seal to no grant, &c. without a proper warrant; nor with warrant where it is against law, or inconvenient, but shall first acquaint the king therewith.

KEEPING, in painting, denotes the representation of objects in the same manner that they appear to the eye at different distances from it; for which the painter should have recourse to the rules of perspective. There are two instances in which the famous Raphael Urbin has transgressed these rules: in one of his cartoons, representing the miraculous draught of fishes, the men in each of the two boats appear of full size, the features of their faces being strongly marked; and the boats are represented so small, and the men so big, that any one of them appears sufficient to sink either of the boats by his own bare weight: and the fowls on the shore are also drawn so big, as to seem very near the eye of the observer, who could not possibly, in that case, distinguish the features of the men in the distant boats. Or, supposing the observer to be in either of the boats, he could not see the eyes or beaks of the fowls on the shore. The other instance occurs in his historical picture of our Saviour's transfiguration on the mount; where he is represented with those who were then with him, almost as large as the rest of his disciples at the foot of the mount, with the father and mother of the boy whom they brought to be cured; and the mother, though on her knees, is more than half as tall as the mount is high. So that the mount appears only of the size of a little hay-rick, with a few people on its top, and a greater number at its bottom on the ground; in which case, a spectator at a little distance could as well distinguish the features of those at the top as of those on the ground. But upon any large eminence, deserving the name of a mount, that would be quite impossible.

KEFTEEN, a large village of Asia, in Syria, 16 miles from Aleppo, on the road to Tripoly. It gives its name to a large, fertile, well-cultivated plain, where they feed a great number of pigeons.

KEGWORTH, a village in Leicestershire, 10 miles S. E. of Derby, and 12 S. W. of Nottingham. It is situated on a beautiful eminence, which commands an extensive prospect over the counties of Nottingham and Derby. Near it is a handsome stone bridge over the Trent, called Cavendish Bridge, it being built at the duke of Devonshire's expence.

KEHL, or **KEIL**, once an important fortress of Germany, in the circle of Suabia. It is seated on the Rhine, opposite Straßburg, to which when the latter was an imperial city it belonged. It was also strongly fortified by the French, who took possession of it in 1684. Being ceded to the empire at the peace of Ryßwick, the emperor assigned it to the house of Baden, reserving to himself, however, the right of a garrison. But this garrison has been since greatly augmented, and the ruins of the ancient fortifications replaced, since the war with the French Republic, with the strongest that could be constructed. E. lon. 7. 53. N. lat. 50. 30.

KEILL (Dr. JOHN), a celebrated astronomer and mathema-

tician, was born at Edinburgh in 1671, and studied in the university of that city. In 1694 he went to Oxford, where, being admitted of Baliol college, he began to read lectures according to the Newtonian system in his private chamber in that college. He is said to have been the first who taught Sir Isaac Newton's principles by the experiments on which they are founded: and this, it seems, he did by an apparatus of instruments of his own providing; by which means he acquired a great reputation in the university. The first specimen he gave the public of his skill in mathematical and philosophical knowledge, was his *Examination of Dr. Burnet's theory of the earth*, with *Remarks on Mr. Whiston's theory*: and these theories being defended by their respective inventors, drew from Mr. Keill *An examination of the reflections on the theory of the earth*, together with *A defence of the remarks on Mr. Whiston's new theory*. In 1701 he published his celebrated treatise entitled *Introductio ad veram physiam*, which only contains 14 lectures; but in the following editions he added two more. This work has been translated into English, under the title of *An Introduction to Natural Philosophy*. Afterwards being made fellow of the Royal Society, he published, in the Philosophical Transactions, a paper on the laws of attraction; and being offended at a passage in the *Acta Eruditorum* of Leipzig, warmly vindicated against Mr. Leibnitz Sir Isaac Newton's right to the honour of the first invention of his method of fluxions. In 1709 he went to New-England as treasurer of the Palatines. About the year 1711, several objections being urged against Sir Isaac Newton's philosophy, in support of Des Cartes's notions of a plenum, Mr. Keill published a paper in the Philosophical Transactions on the rarity of matter, and the tenuity of its composition. But while he was engaged in this dispute, queen Anne was pleased to appoint him her decypherer; and he continued in that place under king George I. till the year 1716. He had also the degree of doctor of physic conferred on him by the university of Oxford in 1713. He died in 1721. He published, besides the works already mentioned, *Introductio ad veram astronomiam*, which was translated into English by Dr. Keill himself; and an edition of Commandinus's *Euclid*, with additions of his own.

KEILL (JAMES), M. D. an eminent physician, and brother of the former, was born in Scotland about the year 1673; and having travelled abroad, read lectures of anatomy with great applause in the universities of Oxford and Cambridge, by the latter of which he had the degree of doctor of physic conferred upon him. In 1700 he settled at Northampton, where he had considerable practice as a physician; and died there of a cancer in the mouth in 1719. He published, 1. An English translation of Lemery's Chemistry. 2. An account of animal secretion, the quantity of blood in the human body, and muscular motion. 3. A treatise on anatomy. 4. Several pieces in the Philosophical Transactions.

KEISERSBERG, a town of Alsace in France, and in the bailiwick of Haguenau, which has belonged to the French ever since the year 1548. It is seated in a pleasant country, in E. lon. 7. 25. N. lat. 48. 10.

KEISERSLAUTERN, a town of Germany, in the Lower Palatinate, belonging to the elector Palatine; seated on the river Lauter, in E. lon. 7. 51. N. lat. 49. 20.

KEISERSTOUL, a town of Switzerland, in the county of Baden, with a bridge over the Rhine, and a castle. It belongs to the bishop of Constance, and is situated in E. lon. 8. 40. N. lat. 47. 10.

KEISERSWERT, a town of Germany in the circle of Westphalia, the diocese of Cologne, and the duchy of Berg; subject to the elector Palatine. The fortifications are demolished. It is seated on the Rhine, in E. lon. 6. 49. N. lat. 51. 16.

KEITH (JAMES), field-marshal in the Prussian service, was the younger son of William Keith, earl-marshal of Scotland;

and was born in 1696. He was designed by his friends for the law; but his inclination led to arms, and the first occasion of drawing his sword was rather an unhappy one. When he was 18 years old, the rebellion broke out in Scotland; and through the instigation of his mother, he joined James's party: he was wounded at the battle of Sheriff-muir, and made his escape to France. Here he applied himself to military studies; and going to Madrid, he by the interest of the duke of Liria obtained a commission in the Irish brigades, then commanded by the duke of Ormond. He afterwards attended the duke of Liria, when he went ambassador to Muscovy; and being by him recommended to the czarina, was promoted to the rank of lieutenant general, and invested with the order of the black eagle. He distinguished himself by his valour and conduct in the Russian service, and had no inconsiderable share in the revolution that raised Elisabeth the daughter of Peter the Great to the throne: he also served in several embassies; but finding the honours of that country but a splendid kind of slavery, he left that court and entered the Prussian service. The king of Prussia made him field marshal of the Prussian armies, and governor of Berlin; and distinguished him so far by his confidence, as to travel in disguise with him over a great part of Germany, Poland, and Hungary. In business, he made him his chief counsellor; in his diversions, his chief companion. The king was much pleased with an amusement which the marshal invented in imitation of the game of chess. The marshal ordered several thousand small statues of men in armour to be cast by a founder; these he would set opposite to each other, and range them in battalia, in the same manner as if he had been drawing up an army; he would bring out a party from the wings or centre, and show the advantage or disadvantage resulting from the different draughts which he made. In this manner the king and the marshal often amused themselves, and at the same time improved their military knowledge. This brave and experienced general, after many important services in the late wars of that illustrious monarch, was killed in the unfortunate affair of Hochkirchen in the year 1758.

The family of Keith was among the most ancient in Europe. In 1010 the Scots gained a complete victory over the Danes at Camus-town in Angus; King Malcolm II. as a reward for the signal bravery of a certain young nobleman who pursued and killed Camus the Danish general, bestowed on him several lands, particularly the barony of Keith in East Lothian, from which his posterity assumed their surname. The king also appointed him hereditary great marshal of Scotland, which high office continued in his family till the year 1715, when the last earl engaged in the rebellion, and forfeited his estate and honours; and thus ended the family of Marshal, after serving their country in a distinguished capacity above 700 years.

KELLINGTON, or CALLINGTON, a borough in Cornwall, with a good market on Wednesday. It is 12 miles S. of Launceston, and 217 W. by S. of London. W. lon. 4. 35. N. lat. 50. 30.

KILLS, a fair and post-town of Ireland, in the county of Meath and province of Leinster, 31 miles from Dublin. It is a borough likewise, and returns two members to parliament; patron earl of Beftive. This place gives title of viscount to the family of Cholmondeley. Near it is Headfort, the magnificent seat of Lord Beftive. This town is pleasantly situated on the river Blackwater, and has four fairs. It was anciently called *Kenamus*, and afterwards *Kenlis*. In former ages it was one of the most famous cities in the kingdom; and on the arrival of the English was walled and fortified with towers. In 1178 a castle was erected where the market-place now is; and opposite to the castle was a cross of an entire stone, ornamented with bas-relief figures and many curious inscriptions in the ancient Irish character. Within a small distance was the church of St. Senan; and on the south of the church-yard is a round tower,

which measures 99 feet from the ground, the roof ending in a point; and near the top were four windows opposite to the cardinal points. There was a celebrated monastery founded here in 550 for regular canons, and dedicated to the Virgin Mary. It owed its origin to St. Columb, to whom the site of the abbey was granted by Dermond Mac Carval, or Dermond the son of Kervail, king of Ireland. An episcopal see was afterwards erected here, which in the 13th century was united to that of Meath. A priory or hospital was also erected by Walter de Lacie, lord of Meath, in the reign of Richard I. for cross-bearers or crouched friars following the order of St. Augustin. There was likewise a perpetual chantry of three priests or chaplains in the parish church of St. Columb in Kells to celebrate mass daily; one in the Rood chapel, another in St. Mary's chapel, and a third in the chapel of St. Catherine the virgin.

KELLS is also the name of a village, being a post and fair-town, in the county of Kilkenny, 64 miles from Dublin. It is an ancient place, situated on Kings-river; and was noted for a priory of Augustines, built and richly endowed by Geoffrey Fitz-Roberts, who came into this kingdom with Strongbow. The prior of this place had the title of *lord spiritual*, and as such sat in the house of peers before the Reformation; the ruins only of this abbey now remain: a synod was held in it anno 1151, when John Paparo, legate from Rome, made one of the number of bishops that were convened there at that time to settle the affairs of the church. The present church is built in the Gothic manner. A fair is held on the 13th of July.

There is a third place of the above name, situated in the county of Antrim and province of Ulster, 89 miles from Dublin, near which are the ruins of a church: this place is but a small village, seated on a river of the same name, over which it has a bridge.

KELLY (HUGH), an author of considerable repute, was born on the banks of Killarney lake in Ireland in 1739. His father, a gentleman of good family, being reduced in fortune by a series of unforeseen misfortunes, was obliged to repair to Dublin that he might endeavour to support himself by his personal industry. A tolerable school education was all he could afford to his son; who was bound an apprentice to a staymaker, and served the whole of his time with diligence and fidelity. At the expiration of his indentures, he set out for London to procure a livelihood by his business; where he encountered all the difficulties a person poor and without friends could be subject to on his first arrival in town. Happening, however, to become acquainted with an attorney, he was employed by him in copying and transcribing: an occupation which he prosecuted with so much assiduity, that he is said to have earned about three guineas a week; an income which, compared to his former gains, might be deemed affluent. Tired, however, of this drudgery, he soon after, about 1762, commenced author, and was intrusted with the management of the *Lady's Museum*, the *Court Magazine*, the *Public Ledger*, the *Royal Chronicle*, *Owen's Weekly Post*, and some other periodical publications, in which he wrote many original essays and pieces of poetry, which extended his reputation, and procured the means of subsistence for himself, his wife to whom he was then lately married, and a growing family. For several years after this period, he continued writing upon a variety of subjects, as the accidents of the times chanced to call for the assistance of his pen; and as during this period politics were the chief objects of public attention, he employed himself in composing many pamphlets on the important questions then agitated, the greater part of which are now buried in oblivion. Among these, however, was a *Vindication of Mr. Pitt's Administration*, which Lord Chesterfield makes honourable mention of in the second volume of his *Letters*. In 1767, *The Babler* appeared in two pocket volumes, which had at first been inserted in *Owen's Weekly Chronicle* in single papers; as did the *Memoirs of a*

Magdalene, under the title of *Louisa Mildmay*. About 1767 he was tempted by the success of Churchill's *Rosciad* to write some strictures on the performers of either theatre, in two pamphlets, entitled *Thyrsis*, both which gave great offence to some of the principal persons at each house. The talents for satire which he displayed in this work recommended him to the notice of Mr. Garrick, who in the next year caused his first play of *Fallé Delicacy* to be acted at Drury-lane. It was received with great applause; and from this time he continued to write for the stage with profit and success, until the last period of his life. As his reputation increased, he began to turn his thoughts to some mode of supporting his family less precarious than by writing, and for that purpose entered himself a member of the Middle Temple. After the regular steps had been taken, he was called to the bar in 1774, and his proficiency in the study of the law afforded promising hopes that he might make a distinguished figure in that profession. His sedentary course of life had, however, by this time injured his health, and subjected him to much affliction. Early in 1777 an abscess formed in his side, which after a few days illness put a period to his life. He was the author of six plays besides that above mentioned.

KELP, in the glass trade, a term used for a sort of potashes made use of in many of the glass works, particularly for the green glass. It is the calcined ashes of a plant called by the same name; and, in some places, of sea-thongs or laces, a sort of thick-leaved fucus or sea-wrack. See *Fucus*. This plant is thrown on the rocks and shores in great abundance, and in the summer months is raked together and dried as hay in the sun and wind, and afterwards burned to the ashes called *kelp*. The process of making it is thus: The rocks, which are dry at low water, are the beds of great quantities of sea-weed; which is cut, carried to the beach, and dried: a hollow is dug in the ground three or four feet wide; round its margin are laid a row of stones, on which the sea-weed is placed, and set on fire within; and quantities of this fuel being continually heaped upon the circle, there is in the centre a perpetual flame, from which a liquid like melted metal drops into the hollow beneath: when it is full, as it commonly is ere the close of day, all heterogeneous matter being removed, the kelp is wrought with iron rakes, and brought to an uniform consistence in a state of fusion. When cool, it consolidates into a heavy dark-coloured alkaline substance, which undergoes in the glass-houses a second vitrification, and assumes a perfect transparency. The progress by which thus a parcel of sea-weed, formerly the stinky bed of seals or dreary shelter of shell-fish, is converted into a crystal lustre for an assembly-room, or a set of glasses for his majesty's table, is a metamorphosis that might be a subject for an entertaining tale.

KELSO, a town of Roxburghshire in Scotland, pleasantly situated on the river Tweed, in W. lon. 1. 20. N. lat. 55. 38. Of this town Mr. Pennant gives the following description: It is built much after the manner of a Flemish town, with a square and town house. It contains about 2700 souls, has a very considerable market, and great quantities of corn are sold here weekly by sample. The abbey of Tyronensians was a vast pile, and, to judge by the remains, of venerable magnificence. The walls are ornamented with false round arches, intersecting each other. Such intersections form a true Gothic arch; and may as probably have given rise to that mode as the arched shades of avenues. The steeple of the church is a vast tower. This house was founded by David I. when earl of Cumberland. He first placed it at Selkirk, then removed it to Roxburgh, and finally, when he came to the crown, fixed it here in 1128. Its revenues were in money above 2000l. Scots a-year. The abbot was allowed to wear a mitre and pontifical robes, to be exempt from episcopal jurisdiction, and permitted to be present at all general councils. The environs of Kelso are very

fine: the lands consist of gentle risings, inclosed with hedges, and extremely fertile. They have much reason to boast of their prospects. From the Chalkheugh is a fine view of the forks of the rivers, Roxburgh-hill, Sir John Douglas's neat seat, and at a distance Fleurus; and from Pinnacle-hill is seen a vast extent of country, highly cultivated, watered with long reaches of the Tweed, well wooded on each margin. These borderers ventured on cultivation much earlier than those on the west and east, and have made great progress in every species of rural economy. Turnips and cabbages for the use of cattle cover many large tracts; and potatoes appear in vast fields. Much wheat is raised in the neighbourhood, part of which is sent up the frith of Forth, and part into England. The fleeces here are very fine. The wool is sent into Yorkshire, to Lincathgow, or into Aberdeenshire for the stocking-manufacture; and some is woven here into a cloth called *plains*, and sold into England to be dressed. Here is also a considerable manufacture of white leather, chiefly to supply the capital of Scotland. At Kelso there is a fine stone-bridge of six arches over the Tweed near its confluence with the Teviot.

KEMAC, a celebrated fort of Asia, 17 miles from Arzen-gain, on the confines of Natolia. It is seated on the river Euphrates.

KEMPEN, a town of Germany, in the electorate of Cologne; seated on the river Niers, 30 miles N. W. of Cologne. E. lon. 6. 30. N. lat. 51. 18.

KEMPIS (THOMAS A), a pious and learned regular canon, was born at the village of Kemp, in the diocese of Cologne, in 1380; and took his name from that village. He performed his studies at Deventer, in the community of poor scholars established by Gerard Groot; and there made a great progress in the sciences. In 1399 he entered the monastery of the regular canons of Mount St. Agnes, near Zwol, of which his brother was prior. Thomas à Kempis there distinguished himself by his eminent piety, his respect for his superiors, his charity to his brother canons, and his continual application to labour and prayer. He died in 1471, aged 70. The best editions of his works, which consist of sermons, spiritual treatises, and lives of holy men, are those of Paris in 1649, and of Antwerp in 1607. The famous and well-known book *De Imitatione Christi*, which has been translated into almost all the languages of the world, though it has almost always been numbered among the works of Thomas à Kempis, is also found printed under the name of *Gerson*; and on the credit of some MSS. has been since ascribed to the abbot Gerson of the order of St. Benedict. This has occasioned a violent dispute between the canons of St. Augustin and the Benedictines: but while devout Christians find spiritual comfort in the work, the name of the writer is of small importance.

KEMPTEN, a free imperial town of Germany, in the territory of the abbot of Kempten, who is a prince of the empire. The inhabitants are Protestants. It is seated on the river Iller, 45 miles S. by W. of Augsburg. E. lon. 10. 21. N. lat. 47. 49.

KEMPTEN, a territory in the circle of Suabia, in Germany, between the bishopric of Augsburg and the barony of Walburg. It is about 47 miles long and broad, and has no considerable place but the towns of Kempten and Kaußbeuren, which are imperial.

KEN (THOMAS), an eminent English bishop in the 17th century, was bred at Winchester-school, whence he went to Oxford; and in 1699 was made a prebend of Winchester. In 1675, the year of the Jubilee, he travelled to Rome; and used to say, He had reason to give God thanks for his travels, having returned more confirmed of the purity of the reformed religion than he was before. He was appointed by king Charles II. to attend the lord Dartmouth at the demolishing of Tangier; and at his return was made chaplain to his ma-

jeſty, as he was ſome time after to the princeſs of Orange, then reſiding in Holland. In 1685 he was conſecrated biſhop of Bath and Wells. The month following he attended king Charles II. at his death; and gave cloſe attendance at the royal bed for three whole days and nights, watching proper intervals to ſuggeſt pious and proper thoughts on ſo ſerious an occaſion. In the following reign he zealouſly oppoſed the progreſs of popery; and in June 1688, he, with five other biſhops and the archbiſhop of Canterbury, was committed priſoner to the Tower of London for ſubſcribing a petition to his majeſty againſt the declaration of indulgence. Upon the Revolution, however, he reſuſed to take the oaths to king William and queen Mary, on which account he was deprived of his biſhopric. Her majeſty queen Anne beſtowed on him a yearly penſion of 200*l.* to his death in 1710. He publiſhed ſeveral pious books. His charity was ſo great, that when he was biſhop of Bath and Wells, having received a ſine of 4000*l.* he gave a great part of it to the French Proteſtants.

KEN, or **KAN**, a river of Weſtmoreland, which flows by Kendal, and empties itſelf into the ſandy waſh of Lancaſhire, called Morcambe Bay. It has a cataract near its mouth, which renders it incapable of navigation; ſo that the village of Milthorpe, ſituated on a little creek near the mouth of the Ken, is the only port of Weſtmoreland; and this is capable of receiving very ſmall veſſels only. Hence the fine Weſtmoreland ſlates are exported to Liverpool, London, Hull, &c.

KEN, a river of Scotland, which deſcending from the mountains in the north of Kirkcudbrightſhire, flows in a ſoutherly direction to the town of New Galloway, below which it expands into a fine lake, about four miles in length, and one in breadth. The river Dee, which deſcends from the weſt, joins the ſtream that iſſues from this lake. Their united waters take the name of that river, and flow to the S. W. till they meet the Iriſh ſea at Kirkcudbright.

KENDAL, a town of Weſtmoreland, ſeated in a valley, among hills, on the weſt ſide of the river Ken or Can, over which there are two ſtone bridges, and one of wood which leads to the caſtle now in ruins. It is a large handsome place; and has two long ſtreets, which croſs each other. The inhabitants have driven a trade with the cotton and woollen manufactory throughout England ever ſince the reign of Edw. III. and particular laws were enacted for regulating Kendal cloths as early as Richard II. and Henry IV. It is of note alſo for the manufactory of cottons, druggets, ſerges, hats, worſted and yarn ſtockings, &c. Queen Elizabeth incorporated it with aldermen and burgeſſes; and king James I. with a mayor, recorder, town-clerk, 12 aldermen, 24 burgeſſes or common councilmen, and 2 attorneys. There are 7 companies here, who have each their hall, viz. mercers, ſheermen, cordwainers, glovers, tanners, taylors, and pewterers. Here is an elegant town-hall lately repaired; and they enjoy a court of conſcience granted by George III. for debts under 40*s.* It has a large beautiful church, which ſtands on the other ſide of the brook called Blindbeck, out of the liberty of the town: a large neat and handsome building 180 feet long and 99 broad, with 5 ailes, each parted by a row of 8 pillars, and a ſtrong ſquare ſteeple. Near is Abbot's hall, the reſidence of the abbot when this church belonged to an abbey diſſolved by Henry VIII. In 1755 a new chapel was erected in the middle of the town, beſides which there are 12 chapels of eaſe belonging to it. The diſſenters and quakers have meeting-houſes. Here is a free grammar-ſchool well endowed; and alſo a charity-ſchool for 10 boys and 16 girls, who are all clothed as well as taught. Eaſtward of the town, on the oppoſite ſide of the river on a hill, from whence is a fine proſpect, ſtand the ruins of a caſtle, wherein was born Catharine Parr (the ſixth wife of Henry VIII.). By the late inland navigation, it has communication with the rivers Merſey, Dee, Ribble, Oule, Trent, Derwent, Severn, Humber, Thames,

Avon, &c. which navigation, including its windings, extends above 500 miles in the counties of Lincoln, Nottingham, York, Lancaſter, Cheſter, Stafford, Warwick, Leiceſter, Oxford, Worceſter, &c. Here are kept the ſeſſions of the peace for this part of the county, called the barony of Kendal; and there is a very great market on Saturday, with all kinds of provisions and woollen-yarn, which the girls bring hither in large bundles. It has fairs on May 6, and November 8; and between them a great beaſt market every fortnight. The river here, which runs half through the town in a ſtony channel, abounds with trout and falmon; and on the banks of it live the dyers and tanners.

KENNEBEK, a river of N. America, which riſes in the northern part of the diſtrict of Main, in New England; and flowing in a ſoutherly direction, falls into the Atlantic Ocean between the bays of Caſco and Penobſcot.

KENNEL, a term uſed indifferently for a puddle, a water-course in the ſtreets, a houſe for a pack of hounds, and the pack or cry of hounds themſelves. Mr. Beckford, in his Eſſay on Hunting, is very particular in deſcribing a kennel for hounds; and a kennel he thinks indiſpenſably neceſſary for keeping thoſe animals in proper health and order. "It is true (ſays he) hounds may be kept in barns and ſtables; but thoſe who keep them in ſuch places can beſt inform you whether their hounds are capable of anſwering the purpoſes for which they are deſigned. The ſenſe of ſmelling is ſo exquisite in a hound, that I cannot but ſuppoſe that every ſtench is hurtful to it. Cleanlineſs is not only abſolutely neceſſary to the noſe of the hound, but alſo to the preſervation of his health. Dogs are naturally cleanly; and ſeldom, if they can help it, dung where they lie. Air and freſh ſtraw are neceſſary to keep them healthy. They are ſubject to the mange; a diſorder to which poverty and naſtineſs will very much contribute. The kennel ſhould be ſituated on an eminence; its front ought to be to the eaſt, and the courts round it ought to be wide and airy to admit the ſunbeams at any time of the day. It is proper that it ſhould be neat without and clean within; and it is required to be near the maſter's houſe, for obvious reaſons. It ought to be made large enough at firſt, as any addition to it afterwards may ſpoil it in appearance at leaſt." Two kennels, however, in our author's opinion, are abſolutely neceſſary to the well-being of hounds: "When there is but one (ſays he), it is ſeldom ſweet; and when cleaned out, the hounds, particularly in winter, ſuffer both while it is cleaning and afterwards as long as it remains wet."

When the feeder firſt comes to the kennel in a morning, he ſhould let out the hounds into the outer court; and in bad weather, ſhould ſhut the door of the hunting kennel (that in which the hounds deſigned to hunt next day are kept), left want of reſt ſhould incline them to go into it. The lodging-room ſhould then be cleaned out, the doors and windows of it opened, the litter ſhaken up, and the kennel made ſweet and clean before the hounds return to it again. The floor of each lodging-room ſhould be bricked, and ſloped on both ſides to run to the centre, with a gutter left to carry off the water, that when they are waſhed they may ſoon be dry. If water ſhould remain through any fault in the floor, it muſt be carefully mopped up; for damps are always very prejudicial.

The kennel ought to have three doors; two in the front and one in the back; the laſt to have a lattice window in it with a wooden ſhutter, which is conſtantly to be kept cloſed when the hounds are in, except in ſummer, when it ſhould be left open all the day.

At the back of Mr. Beckford's kennel is a houſe thatched and turzed up on the ſides, big enough to contain at leaſt a load of ſtraw. Here ſhould be a pit ready to receive the dung, and a gallows for the fleſh. The gallows ſhould have a thatched roof, and a circular board at the poſts to prevent vermin from

climbing up. He advises to enclose a piece of ground adjoining to the kennel for such dog-horses as may be brought alive; it being sometimes dangerous to turn them out where other horses go, on account of the disorders with which they may be infected. In some kennels a stove is made use of; but where the feeder is a good one, Mr Beckford thinks that a mop properly used will render the stove unnecessary. "I have a little hay-rick (says he) in the grass-yard, which I think is of use to keep the hounds clean and fine in their coats. You will frequently find them rubbing themselves against it. The shade of it is also useful to them in summer. If ticks at any time be troublesome in your kennel, let the walls of it be well washed; if that should not destroy them, the walls must then be white-washed."

Besides the directions already given concerning the situation of the kennel, our author recommends it to have a stream of water in its neighbourhood, or even running through it if possible. There should also be moveable stages on wheels for the hounds to lie on. The soil ought at all events to be dry.

To KENNEL, a term applied by fox-hunters to a fox when he lies in his hole.

KENNET (Dr. WHITE), a learned English writer, and bishop of Peterborough, in the 18th century, bred at St. Edmund-hall, Oxford; where he soon distinguished himself by his vigorous application to his studies, and by his translations of several books into English, and other pieces which he published. In 1695 our author published his *Parochial Antiquities*. A sermon preached by him on the 30th of January 1703 at Aldgate exposed him to great clamour. It was printed under the title of *A dispassionate inquiry into the causes of the civil war*. In 1706, he published his case of Improvements, and two other tracts on the same subject. In 1708, he published the third volume of *The Complete History of England* (the two former volumes compiled by Mr. Hughes). In 1709, he published *A Vindication of the Church and Clergy of England from some late reproaches rudely and unjustly cast upon them*; and a true Answer to Dr. Sacheverel's Sermon. When the great point in Dr. Sacheverel's trial, the change of the ministry, was gained, and very strange addresses were made upon it, there was to be an artful address from the bishop and clergy of London, and they who would not subscribe it were to be represented as enemies to the queen and the ministry. Dr. Kennet fell under this imputation. He was exposed to great odium as a low-church man, on account of his conduct and writings. When he was dean of Peterborough, a very uncommon method was taken to expose him by Dr. Walton, rector of the church of White-chapel; for in the altar-piece of that church, which was intended for a representation of Christ and his 12 apostles eating the passover and last supper, Judas the traitor was drawn sitting in an elbow-chair, dressed in a black garment, with a great deal of the air of Kennet's face. It was generally said that the original sketch was for a bishop under Dr. Walton's disguise; but the painter being apprehensive of an action of *Scandalum Magnatum*, leave was given to drop the bishop, and make the dean. This giving general offence, upon the complaint of others (for Dr. Kennet never saw it, or seemed to regard it), the bishop of London ordered the picture to be taken down. In 1713, he presented the Society for propagating the Gospel with a great number of books suitable to their design; published his *Bibliotheca Americana Primordia*, and founded an antiquarian and historical library at Peterborough. In 1715, he published a sermon, intitled *The Witchcraft of the present Rebellion*, and afterward several other pieces. In 1717, he was engaged in a dispute with Dr. William Nicholson, bishop of Carlisle, relating to some alterations in the bishop of Bangor's famous sermon; and disliked the proceeding of the Convocation against that bishop. Upon the death of Dr. Cumberland bishop of Peterborough,

he was promoted to that see, to which he was consecrated in 1718. He sat in it more than ten years, and died in 1728. He was an excellent philologist, a good preacher, whether in English or Latin, and well versed in the histories and antiquities of our nation.

KENNET (Basil), a learned English writer, and brother to the preceding, was educated in Corpus Christi college, in the university of Oxford, where he became fellow. In 1706 he went over chaplain to the English factory at Leghorn; where he met with great opposition from the Papists, and was in danger from the Inquisition. He died in the year 1714. He published *Lives of the Greek poets*; the *Roman Antiquities*; a volume of *Sermons preached at Leghorn*; A translation into English of Puffendorf's *Treatise of the Law of Nature and Nations*. He was a man of most exemplary integrity, generosity, piety, and modesty.

KENNER, a river, which rises among the chalky hills in the middle of Wilts, and flows to Newbury in Berks, where it becomes navigable, and below which it is augmented by the Lamborn. It then keeps along the southern edge of the county, till, turning up to Reading, it mingles with the Thames. Pope has celebrated this river, as "the Kennet swift, for silver eels renown'd."

KENNICOTT (Dr. BENJAMIN), well known in the learned world for his elaborate edition of the Hebrew Bible and other valuable publications, was born at Totness in Devonshire in the year 1718. With the rank and character of his parents we are entirely unacquainted; but it is certain they were unable to satisfy that thirst for knowledge which they could not but discover in their son. Some opportunities of early improvement must, however, have been afforded him, or (which we sometimes see) the natural vigour of his mind must have superseded the necessity of them. For in the year 1743, he wrote *A Poem on the Recovery of the Hon. Mrs. Eliz. Courtenay from her late dangerous Illness*; and this probably recommended him to the notice of those gentlemen who afterwards sent him to Oxford and supported him there. In judging of this performance, they may be supposed to have considered not so much its intrinsic merit, as the circumstances under which it was produced. For though it might claim just praise as the fruit of youthful industry struggling with obscurity and indigence, as a poem it never rises above mediocrity, and generally sinks below it. But in whatever light these verses were considered, the publication of them was soon followed by such contributions as procured for the author the advantages of an academical education. In the year 1744 he entered at Wadham college; nor was it long before he distinguished himself in that particular branch of study in which he afterwards became so eminent. His two dissertations, *On the Tree of Life*, and the *Oblations of Cain and Abel*, came to a second edition so early as the year 1747, and procured him the singular honour of a bachelor's degree conferred on him *gratis* by the University a year before the statutable time. The dissertations were gratefully dedicated to those benefactors whose liberality had opened his way to the University, or whose kindness had made it a scene not only of manly labour, but of honourable friendship. With such merit and such support, he was a successful candidate for a fellowship of Exeter college; and soon after his admission into that society, he distinguished himself by the publication of several occasional sermons. In the year 1753 he laid the foundation of that stupendous monument of learned industry, at which the wise and the good will gaze with admiration, when prejudice, and envy, and ingratitude, shall be dumb. This he did by publishing his first dissertation on the state of the Printed Hebrew Text, in which he proposed to overthrow the then prevailing notion of its absolute integrity. The first blow, indeed, had been struck long before, by Capellus, in his *Critica Sacra*, published after his

death by his son, in 1650—a blow which Buxtorf, with all his abilities and dialectical skill, was unable to ward off. But Capellus having no opportunity of consulting MSS. though his arguments were supported by the authority of the Samaritan Pentateuch, of parallel passages, and of the ancient versions, could never absolutely prove his point. Indeed the general opinion was, that the Hebrew MSS. contained none, or at least very few and trifling variations from the printed text; and with respect to the Samaritan Pentateuch very different opinions were entertained. Those who held the Hebrew verity, of course condemned the Samaritan as corrupt in every place where it deviated from the Hebrew: and those who believed the Hebrew to be incorrect, did not think the Samaritan of sufficient authority to correct it. Besides, the Samaritan itself appeared to a very great disadvantage; for no Samaritan MSS. were then known, and the Pentateuch itself was condemned for those errors which ought rather to have been ascribed to the incorrectness of the editions. In this dissertation, therefore, Dr. Kennicott proved that there were many Hebrew MSS. extant, which, though they had hitherto been generally supposed to agree with each other, and with the Hebrew text, yet contained many and important various readings; and that from those various readings considerable authority was derived in support of the ancient versions. He announced the existence of six Samaritan MSS. in Oxford only, by which many errors in the printed Samaritan might be removed; and he attempted to prove, that even from the Samaritan, as it was already printed, many passages in the Hebrew might undoubtedly be corrected. This work, as it was reasonable to expect, was examined with great severity both at home and abroad. In some foreign universities the belief of the Hebrew verity, on its being attacked by Capellus, had been insisted on as an article of faith—*Ista Capelli sententia adeo non approbata fuit Fidei sociis, ut potius Helvetii theologi, et speciatim Genevenses, anno 1678, peculiari canone caverint, ne quis in ditione sua minister ecclesiæ recipiatur, nisi fateatur publice, textum Hebræum, ut bodie est in exemplaribus Masoreticis, quoad consonantes et vocales, divinum et authenticum esse* (Volsii Biblioth. Heb. tom. ii. 27). And at home this doctrine of the corrupt state of the Hebrew text was opposed by Comings and Bate, two Hutchinsonians, with as much violence as if the whole truth of the revelation were at stake.

The next three or four years of Dr. Kennicott's life were principally spent in searching out and examining Hebrew MSS. though he found leisure not only to preach, but to publish several occasional sermons. About this time Dr. Kennicott became one of the king's preachers at Whitehall; and in the year 1759 we find him vicar of Culham in Oxfordshire. In January 1760 he published his second dissertation on the state of the Hebrew Text; in which, after vindicating the authority and antiquity of the Samaritan Pentateuch, he disarmed the advocates for the Hebrew verity of one of their most specious arguments. They had observed, that the Chaldee Paraphrase having been made from Hebrew MSS. near the time of Christ, its general coincidence with the present Hebrew Text must evince the agreement of this last with the MSS. from which the paraphrase was taken. Dr. Kennicott demonstrated the fallacy of this reasoning, by shewing that the Chaldee Paraphrase had been frequently corrupted, in order to reconcile it with the printed text; and thus the weapons of his antagonists were successfully turned upon themselves. He appealed also to the writings of the Jews themselves on the subject of the Hebrew Text, and gave a compendious history of it from the close of the Hebrew canon down to the invention of printing, together with a description of 103 Hebrew MSS. which he had discovered in England, and an account of many others preserved in various parts of Europe. A collation of the He-

brew MSS. was now loudly called for by the most learned and enlightened of the friends of biblical criticism; and in this same year (1760) Dr. Kennicott emitted his proposals for collating all the Hebrew MSS. prior to the invention of printing, that could be found in Great Britain and Ireland, and for procuring at the same time as many collations of foreign MSS. of note, as the time and money he should receive would permit. His first subscribers were the learned and pious Archbishop Secker, and the delegates of the Oxford press, who, with that liberality which has generally marked their character, gave him an annual subscription of 40l. In the first year the money received was about 500 guineas, in the next it rose to 900, at which sum it continued stationary till the tenth year, when it amounted to 1000. During the progress of the work the industry of our author was rewarded by a canonry of Christ Church. He was also presented, though we know not exactly when, to the valuable living of Mynhenyote, in Cornwall, on the nomination of the Chapter of Exeter. In 1776 the first volume was published, and in 1780 the whole was completed. If now we consider that above 600 MSS. were collated, and the whole work occupied 20 years of Dr. Kennicott's life, it must be owned that sacred criticism is more indebted to him than to any scholar of any age. Within two years of his death, he resigned his living in Cornwall, from conscientious motives, on account of his not having a prospect of ever again being able to visit his parish. Although many good and conscientious men may justly think, in this case, that his professional labours carried on elsewhere might properly have entitled him to retain this preferment, and may apply this reasoning in other cases; yet a conduct so signally disinterested deserves certainly to be admired and celebrated. Dr. Kennicott died at Oxford, after a lingering illness, September 18, 1783; and left a widow, who was sister to the late Edward Chamberlayne, Esq. of the treasury. At the time of his death he was employed in printing *Remarks on Select Passages in the Old Testament*; which were afterwards published, the volume having been completed from his papers.

KENNINGTON, a village of Surry, in the parish of Lambeth. Here is a barn, called the Long Barn, the remains of a royal palace, which was the residence, in particular, of Edward the Black Prince. Kennington Common is the place of execution for the county of Surry.

KENO. See KINO.

KENOQUE, a fort in Austrian Flanders, between Ypres and Furnes, six miles from Dixmude.

KENRICK (WILLIAM), an author of considerable abilities, was the son of a citizen of London, and brought up, it is said, to a mechanical employment. This, however, he seems early to have abandoned; and to have devoted his talents to the cultivation of letters, by which he supported himself during the rest of a life which might be said to have passed in a state of warfare, as he was seldom without an enemy to attack or to defend himself from. He was for some time student at Leyden, where he acquired the title of J. U. D. Not long after his return to England, he figured away as a poet in *Epistles Philosophical and Moral*, 1759, addressed to Lorenzo; an avowed defence of infidelity, written whilst under confinement for debt, and with a declaration that he was "much less ambitious of the character of a poet than of a philosopher." From this period he became a writer by profession; and the Proteus shapes under which he appeared, it would be a fruitless attempt to trace. He was for a considerable time a writer in *The Monthly Review*; but quarrelling with his principal, he began a *New Review* of his own. When our great Lexicographer's edition of Shakespeare first appeared in 1765, it was followed in a fortnight by a pamphlet, entitled, "A Review of Dr. Johnson's new Edition of Shakespeare, in which

the ignorance or inattention of that editor is exposed, and the poet defended from the persecution of his commentators, 1765." This pamphlet was followed by an Examination of it, and that by a Defence in 1766; in which year he produced his pleasant comedy of Falstaff's Wedding, at first intended to have been given to the public as an original play of Shakespeare retrieved from obscurity, and is, it must be acknowledged, a happy imitation of our great dramatic bard. With the celebrated English Rascius Dr. Kenrick was at one time on terms of the strictest intimacy; but took occasion to quarrel with him in print, in a mode too unmanly to be mentioned. In politics also he made himself not a little conspicuous; particularly in the dispute between his friends Wilkes and Horne. He was the original editor of The Morning Chronicle; whence being ousted for neglect, he set up a new one in opposition. He translated in a very able manner the *Emilius* and the *Eloisa* of Rousseau; the *Elements of the History of England* by Millot (to injure, if possible, a translation of the same work by Mrs. Brooke); and produced several dramatic performances, together with an infinite variety of publications both original and translated. To him also the public are indebted for the collection (imperfect as it is) of The Poetical Works of Robert Lloyd, M. A. 1774, two vols. 8vo. Dr. Kenrick died June 9, 1777.

KENSINGTON, a village of Middlesex, on the western road from London, near 2 miles from Hyde Park Corner. It is extremely populous; and besides the palace, now neglected, contains many genteel houses, and several boarding-schools. The palace, which was the seat of the Lord Chancellor Finch afterwards Earl of Nottingham, was purchased by King William; who greatly improved it, and caused a royal road to be made to it, through St. James's and Hyde Parks, with lamp-posts erected at equal distances on each side. Queen Mary enlarged the gardens. Her sister Queen Ann improved what Mary had begun; and was so pleased with the place, that she frequently supped during the summer in the green-house, which is a very beautiful one: but Queen Caroline completed the design by extending the gardens from the great road in Kensington towards Acton; by bringing what is called the Serpentine-River into them; and by taking in some acres out of Hyde-Park, on which she caused a mount to be erected, with a chair on it that could be easily turned round for shelter from the wind, since decayed. This mount is planted about with ever-greens, and commands a fine view over the noble gardens, and the country south and west. They were originally designed by *Kent*, and were afterwards much improved by *Brown*; and though they contain no striking beauties, which their flat situation will not admit, yet they have many pleasing parts, and afford much delight to the inhabitants of London, particularly to those whose professions will not allow of frequent excursions to more distant places. These gardens, which are three miles and a half in compass, are kept in great order. The palace indeed has none of that grandeur which ought to appear in the residence of a British monarch; but the royal apartments are noble, and some of the pictures good. It was at this place King William, Prince George of Denmark, Queen Ann, and King George II. died. The old church was pulled down in 1696, and a much better one built in its room. Part of this village, from the palace-gate to the Bell, is in the parish of St. Margaret's, Westminster.

KENT, one of the counties of England, situated at the south-east corner of the island, and from thence enjoying many advantages. The capacious estuary of the Thames washes its northern parts, as the sea does the south-east; whence some with no great impropriety have styled it a *peninsula*. In point of extent, this is the fifth shire in South Britain, little less in its dimensions than the province of Holland; larger in size

than the duchy of Juliers in Germany; and almost exactly equal to that of Modena in Italy. Kent is, with great appearance of truth, supposed to be so styled from the ancient British word *kant*, signifying a *corner*, or, when applied to a country, an *head-land*. It is certain, that the Romans bestowed the name of *Cantium* on the province, and on its most conspicuous promontory the north Foreland; and from the district they inhabited, the people were called *Cantii*; which has prevailed even to our times, when *Kent*, and *the men of Kent*, are the common appellatives. It is however probable, that these Cantii were not the original inhabitants, but a later colony from the opposite continent, established here, like the Belgæ, not long before the Roman invasion. At the time of Cæsar's coming, this spacious and fertile region was divided into four principalities, or, as they are, according to the manners of those days, commonly called, *kingdoms*. It was his observation of these people, that they were particularly distinguished by their civility and politeness; a character which their descendants have preserved. When that wise people became masters of the southern parts of the island, this province received the most conspicuous marks of their attention, as appears from the stations which they so prudently established, while their government flourished in its full vigour. The care they took of the ports on the sea-coast as soon as it came to be in danger, and the several fortresses which they erected for the defence of their subjects against the sudden attempts of barbarous invaders, are evidences of the same kind. These forts, so prudently disposed, and so well secured, were under the direction of a particular great officer, called *Littoris Saxonici Comes*, i. e. the count of the Saxon shore; which office seems to have been preserved by the British monarchs who governed here, after the Romans quitted the isle. The Saxon kings of Kent discharged this trust in their legal capacity, from the middle of the fifth to the beginning of the ninth century. Under the Norman princes, this post was again revived, though with a change of title, in the *Lord Warden of the Cinque Ports*. Indeed, under all governments the people of Kent have been especially considered; as appears from their claim to the post of honour in our land-armies, and the privileges granted to their havens in consideration of their undertaking the defence of our channel.

As to the climate of this county, it varies according to the situation of places. In the low flat lands, and especially in the marshes, the air is heavy, moist, and unhealthy; and yet not to such a degree as it has been sometimes represented; for, with a little care and caution, strangers, as well as natives, quickly reconcile their constitutions to the temperature even of these parts, and live in them without much inconvenience or apparent danger. But, in reference to the rest of the county, the air is as thin, pure, and wholesome, as in any part of Britain. There is no region more happily or more beautifully diversified in regard to soil, so that every kind thereof is, somewhere or other, to be met with in its bounds; and in no shire are any of these soils more fertile than they are in this. The Weald yields variety of fine timber, particularly of che'nut; the middle part has very rich arable land, annually bearing every species of grain in very great plenty, and these excellent in their several sorts. There are also many beautiful orchards, which produce a variety of fine fruits, and more especially apples and cherries, which were introduced here from Flanders by one Richard Harris, who was the king's fruiterer, in the reign of Henry VIII. The flat country is renowned for its meadows; and Rumney-marsh has hardly its equal. We may from this concise description very easily collect, that the natural products of Kent are numerous and of great value. In the bowels of the earth they find, in several places, a rough hard serviceable stone for paving, which turns to some ad-

vantage; but not so much as their exquisite fullers-earth, rich marl, and fine chalk, which are there in abundance. If we except iron-ore, indeed, they have no mines; but there are prodigious heaps of copperas-stones thrown on the coast. The isle of Shepey, and all the adjacent shore as far as Recnlver, is justly famous for its wheat. Thanet is in no less credit for its barley, or rather was so; for it now produces, through the painful industry and skilful husbandry of its inhabitants, copious crops of good wheat as well as barley. Horses, black cattle, and sheep, they have in great numbers, and remarkable in point of size; and hop-grounds in all parts of the county, which turn to very considerable account. To which we may add, weld, or as some call it *dyers-wced*, which is a very profitable commodity, and of which there grows much in the neighbourhood of Canterbury; also madder, which is, or has been, occasionally cultivated. The rivers and sea-coasts abound with fish of different kinds. The excellency of its oysters on the eastern shore is celebrated by the Roman poets. Those of Faversham and Milton are not only in great esteem at the London market, but are likewise sent in great quantities to Holland.

The many rich commodities produced in this county is the reason why most of our writers have represented it as in a manner void of manufactures; which, however, as appears upon a strict and impartial examination, is very far from being the case. Of iron-works there were anciently many; and there are still some, where kettles, bombs, bullets, cannon, and such like, are made. At Deptford Sir Nicholas Crispe had in his lifetime a very famous copperas work; and, indeed, there that ingenious gentleman, one of the greatest improvers and one of the most public-spirited persons this nation ever bred, introduced several other inventions. Copperas was also formerly made, together with brimstone, in the isle of Shepey. But the original and for many ages the principal manufacture of this county was broad cloth of different colours, established chiefly at Cranbrook by King Edward III. who brought over Flemings to improve and perfect (the trade being introduced long before) his subjects in that important art. At this and other places it flourished so much, that even at the close of Queen Elizabeth's reign, and according to some accounts much later, the best for home consumption, and the largest quantities for exportation, were wrought here; many fulling-mills being erected upon almost every river, and the greatest plenty of excellent fullers-earth affording them singular assistance; in-somuch that it is still a tradition, that the yeomanry of this county, for which it has been ever famous, were mostly the descendants of rich clothiers, who laid out the money acquired by their industry in the purchase of lands, which they transmitted, with their free and independent spirit, to their posterity. The duke of Alva's persecution of the Protestants in the Low Countries drove a multitude of Walloons over hither, who brought with them that ingenuity and application for which they had been always distinguished. These diligent and active people settled a manufactory of flannel or baize at Sandwich. By them the silk-loom was set up at Canterbury, where they still subsist; and they also introduced the making of thread at Maidstone, where it yet remains, and merits more notice and encouragement than hitherto it has met with.

Upon the river Dart, at the confluence of which with the Thames stands the town of Dartford, was set up, in the reign of Queen Elizabeth, the first mill for making white paper, by Mr. John Spilman, a German, upon whom, long after, King James conferred the honour of knighthood; but King Charles more sensibly bestowed upon this Sir John Spilman a patent, and a pension of 200l. a year, as a reward of his invention, and for the support of the manufacture. About the year

1590, Godfrey Box, a German, erected upon the same river the first flattening-mill which was ever used for making iron-wire; and also the first battery-mill for making copper-plates. Other new inventions, requiring the assistance of water, have been set up on other streams; and a great variety of machines of this sort still subsist in different parts of this county. But these things are now so common, that it would be both tedious and useless to insist upon them. Amongst these, we may reckon the making gunpowder in several places. That manufacture, however, which is now the glory of this county, and indeed of Britain, is ship-building; more especially at the royal yards; as at Woolwich, which was settled by Henry VIII. and some considerable ships built there. At present, there is not only a most complete establishment for the building and equipping men of war, a rope walk, foundery, and magazines; but also many private docks, in which prodigious business is carried on, and multitudes of people are employed.

KENTISH-TOWN, a village of Middlesex, three miles north of London, near Hampstead, much improved of late by several handsome houses belonging to the citizens of London, &c. A new chapel has lately been erected there.

KENTUCKY, a country in N. America, situated in its central part, near the latitude of 38° N. and 85° W. longitude. It is bounded on the north by Great Sandy Creek; by the Ohio on the N. W. by N. Carolina on the S. and by the Cumberland mountain on the E. It is upwards of 250 miles in length, and 200 in breadth; and at present divided into seven counties, Lincoln, Fayette, Bourbon, Mercer, Jefferson, Nelson, and Maddison. The principal rivers are the Ohio, Kentucky, Licking River, Red River, Elkhorn, Dick's River, Green River, Cumberland River, and Great Kenhaway or New River. These are all navigable for boats almost to their sources, without rapids, for the greatest part of the year. This country is generally level, and abounding with limestone, which usually lies about six feet deep, except in hollows, where streams run, where we find the rock in the bottom of the channel. The springs and streams lessen in June, and continue low, hindering navigation, until November, when the autumnal rains soon prepare the rivers for boats, and replenish the whole country with water. The soil is amazingly fertile. The inhabitants distinguish its quality by first, second, and third rate lands; and scarcely any such thing as a marsh or swamp is to be found. This country is more temperate and healthy than the other settled parts of America. The winter begins about Christmas, and ends about the first of March; at farthest does not exceed the middle of that month. Snow seldom falls deep, or lies long. The W. winds often bring storms, and the E. winds clear the sky; but there is no steady rule of weather in that respect, as in the Northern States. The W. winds are sometimes cold and nitrous. The Ohio running in that direction, and there being mountains on that quarter, the westerly winds, by sweeping along their tops, in the cold regions of the air, and over a long tract of frozen water, collect cold in their course, and convey it over the country; but the weather is not so intensely severe as that which these winds bring with them in Pennsylvania. The country, in general, may be considered as well timbered, producing large trees of many kinds, and to be exceeded by no country in variety. Those which are peculiar to Kentucky are the sugar-tree, which grows in all parts in great plenty, and furnishes every family with plenty of excellent sugar; and the honey-lo-cust, which is curiously surrounded by large thorny spikes, bearing broad and long pods in form of peas: this has a sweet taste, and makes excellent beer. Here are also the coffee-tree, which greatly resembles the black oak, grows large, and also bears a pod, in which is enclosed coffee; the papaw-tree, which does not grow to a great size, is a soft wood, bears a fine fruit, much like a cucumber in shape and size, which tastes sweet; the cucum-

ber-tree, which is small and soft, with remarkable leaves, and bears a fruit much resembling that from which it is named; black mulberry-trees in abundance; the wild cherry-tree, which is of a large size, and supplies the inhabitants with boards for all their buildings; the buck-eye, a very soft wood, bearing a remarkable black fruit; and some other kinds of trees not common elsewhere. Here is great plenty of fine cane, on which the cattle feed, and grow fat. This plant, in general, grows from three to twelve feet high, of a hard substance, with joints at eight or ten inches distance along the stalk, from which proceed leaves resembling those of the willow. There are many cane-brakes so thick and tall, that it is difficult to pass through them. Where no cane grows, there is abundance of wild rye, clover, and buffalo-grass, covering vast tracts of country, and affording excellent food for cattle. The fields are covered with abundance of wild herbage not common to other countries; as the Shawanese sallad, wild lettuce, pepper grass, and many more, as yet unknown to the inhabitants, but which, no doubt, have excellent virtues. Here are seen the finest crown-imperials in the world, and the cardinal-flower, so much extolled for its scarlet colour; and all the year, excepting the winter months, the plains and valleys are adorned with variety of flowers of the most admirable beauty. Here is also found the tulip-bearing laurel-tree, or magnolia, which has an exquisite smell, and continues to blossom and seed for several months together. Iron ore and lead are found in abundance, but we do not hear of any silver or gold mines. The western waters produce plenty of fish and fowl. The fish common to the Ohio are, the buffalo-fish, of a large size, and the cat-fish, sometimes exceeding one hundred weight. Trout have been taken in Kentucky weighing about 30 pounds. The mullet, roach, perch, garfish, and eel, are here in plenty. Suckers, sunfish, and other hook-fish, are abundant. On these waters, and especially on the Ohio, the geese and ducks are amazingly numerous. The land fowls are, turkeys; a species of grouse, which the inhabitants call pheasants; and quails, to which they give the name of partridges. Here likewise is the parroquet, a bird every way resembling a parrot, but much smaller; and the ivory-bill woodcock, of a whitish colour, with a white plume. It flies screaming exceedingly sharp; and it is asserted, that its bill is pure ivory; a circumstance very singular in the plumey tribe. Here also is the great owl, resembling its kind in other parts, but remarkably different in its vociferation, sometimes making a strange, surprising noise, like a man in the most extreme danger and difficulty. Serpents are not numerous, and are such as are to be found in other parts of the continent, except the bull, the horned, and the mockason snakes. Among the native animals is the buffalo, much resembling a large bull, of a great size, with a large head, thick, short, crooked horns, and broader in his forepart than behind. Upon his shoulder is a large lump of flesh, covered with a thick bos of long wool and curly hair, of a dark-brown colour. They do not rise from the ground as our cattle, but spring up at once upon their feet; are of a broad make, and clumsy appearance, with short legs; but run fast, and turn not aside for any thing when chased, except a standing tree. They weigh from five to ten hundred weight, are excellent meat, supplying the inhabitants in many parts with beef; and their hides make good leather. They are innocent harmless creatures. There are still to be found many deer, elks, and bears. There are also panthers, wild cats, and wolves. The waters have plenty of beavers, otters, minks, and musk rats; nor are the animals common to other parts wanting, such as foxes, rabbits, squirrels, racoons, ground-hogs, polecats, and opossums. Most of the species of the domestic quadrupeds have been introduced since the settlement, such as horses, cows, sheep, and hogs, which are prodigiously multiplied, suffered to run in the woods without a keeper, and brought home only when wanted. Many

caves are found in this country amazingly large; in some of which we may travel several miles under a fine limestone rock, supported by curious arches and pillars: in most of them runs a stream of water. Kentucky, which in the year 1784 was computed to contain 30,000 souls, has been since rapidly increasing in population, and now forms one of the fifteen United States of America. Lexington is the capital.

KENTUCKY, a river of N. America, which rises with three heads from a mountainous part of the country of the same name. Its N. branch, which interlocks with Cumberland River, runs half way in a W. direction, and N. W. the other half, and falls into the Ohio in N. latitude 38. 27. It is amazingly crooked for upwards of 200 miles in length. Among the natural curiosities of the country are the winding banks of this river, and of that called Dick's River. They are rather precipices than banks; for, almost every where, the astonished eye beholds three or four hundred feet of a solid perpendicular limestone rock; in some parts a fine white marble, either curiously arched, pillared, or shaped up into fine building stones. These precipices are like the sides of a deep trench, or canal; the land above being level, except where creeks set in, and crowned with fine groves of red cedar. It is only at particular places that this river can be crossed, one of which is worthy of admiration; a great road, large enough for waggons to pass through, sloping with an easy descent from the top to the bottom of a very large steep hill, at or near the river above Leefstown.

KEPLER (JOHN), a very eminent astronomer and mathematician, was born at Weil, in the county of Wirtemberg, in 1571. He was the disciple of Mæstlinus, a learned mathematician and astronomer, of whom he learned those sciences, and became afterwards professor of them to three successive Emperors, viz. Matthias, Rudolphus, and Ferdinand II.

To this sagacious philosopher we owe the first discovery of the great laws of the planetary motions, viz. that the planets describe areas that are always proportional to the times; that they move in elliptical orbits, having the sun in one focus; and that the squares of their periodic times are proportional to the cubes of their mean distances; which are now generally known by the name of Kepler's Laws. But as this great man stands as it were at the head of the modern reformed astronomy, he is highly deserving of an accurate account, which we shall extract chiefly from the words of that great mathematician Mr. Maclaurin.

Kepler had a particular passion for finding analogies and harmonies in nature, after the manner of the Pythagoreans and Platonists; and to this disposition we owe such valuable discoveries as are more than sufficient to excuse his conceits. Three things, he tells us, he anxiously sought to find out the reason of, from his early youth; viz. Why the planets were 6 in number? Why the dimensions of their orbits were such as Copernicus had described from observations? And what was the analogy or law of their revolutions? He sought for the reasons of the two first of these, in the properties of numbers and plane figures, without success. But at length reflecting, that while the plane regular figures may be infinite in number, the regular solids are only five, as Euclid had long ago demonstrated; he imagined, that certain mysteries in nature might correspond with this remarkable limitation inherent in the essences of things; and he rather, as he found that the Pythagoreans had made great use of those five regular solids in their philosophy. He therefore endeavoured to find some relation between the dimensions of these solids and the intervals of the planetary spheres: thus, imagining that a cube inscribed in the sphere of Saturn would touch by its six planes the sphere of Jupiter; and that the other four regular solids in like manner fitted the intervals that are between the spheres of the other planets; he became persuaded that this was the true reason why the primary planets

were precisely six in number, and that the author of the world had determined their distances from the sun, the centre of the system, from a regard to this analogy. Being thus possessed, as he thought, of the grand secret of the Pythagoreans, and greatly pleased with his discovery, he published it in 1596, under the title of *Mysterium Cosmographicum*; and was for some time so charmed with it, that he said he would not give up the honour of having invented what was contained in that book, for the electorate of Saxony.

Kepler sent a copy of this book to Tycho Brahe, who did not approve of those abstract speculations concerning the system of the world, but wrote to Kepler, first to lay a solid foundation in observations, and then, by ascending from them, to endeavour to come at the causes of things. Tycho however, pleased with his genius, was very desirous of having Kepler with him to assist him in his labours: and having settled, under the protection of the Emperor, in Bohemia, where he passed the last years of his life, after having left his native country on some ill usage, he prevailed upon Kepler to leave the university of Gratz, and remove into Bohemia with his family and library, in the year 1600. But Tycho dying the next year, the arranging the observations devolved upon Kepler, and from that time he had the title of Mathematician to the Emperor all his life, and gained continually more and more reputation by his works. The Emperor Rudolph ordered him to finish the tables of Tycho Brahe, which were to be called the *Rudolphine Tables*. Kepler applied diligently to the work: but unhappy are those learned men who depend upon the good humour of the intendants of the finances; the treasurers were so ill affected towards our author, that he could not publish these tables till 1627. He died at Ratibon in 1630, where he was soliciting the payment of the arrears of his pension.

Kepler made many important discoveries from Tycho's observations, as well as his own. He found, that astronomers had erred, from the first rise of the science, in ascribing always circular orbits and uniform motions to the planets; that, on the contrary, each of them moves in an ellipsis which has one of its foci in the sun: that the motion of each is really unequal, and varies so, that a ray supposed to be always drawn from the planet to the sun describes equal areas in equal times.

It was some years later before he discovered the analogy there is between the distances of the several planets from the sun, and the periods in which they complete their revolutions. He easily saw, that the higher planets not only moved in greater circles, but also more slowly than the nearer ones; so that, on a double account, their periodic times were greater. Saturn, for example, revolves at the distance from the sun $9\frac{1}{2}$ times greater than the earth's distance from it; and the circle described by Saturn is in the same proportion: but as the earth revolves in one year, so, if their velocities were equal, Saturn ought to revolve in 9 years and a half; whereas the periodic time of Saturn is about 29 years. The periodic times of the planets increase, therefore, in a greater proportion than their distances from the sun: but yet not in so great a proportion as the squares of those distances; for, if that were the law of the motions (the square of $9\frac{1}{2}$ being $90\frac{1}{4}$), the periodic time of Saturn ought to be above 90 years. A mean proportion between that of the distances of the planets, and that of the squares of those distances, is the true proportion of the periodic times; as the mean distance between $9\frac{1}{2}$ and its square $90\frac{1}{4}$ gives the periodic time of Saturn in years. Kepler, after having committed several mistakes in determining this analogy, hit upon it at last, May the 15th, 1618; for he is so particular as to mention the precise day when he found that "the squares of the periodic times were always in the same proportion as the cubes of their mean distances from the sun."

When Kepler saw, according to better observations, that his disposition of the five regular solids among the planetary spheres was not agreeable to the intervals between their orbits, he endeavoured to discover other schemes of harmony. For this purpose, he compared the motions of the same planet at its greatest and least distances, and of the different planets in their several orbits, as they would appear viewed from the sun; and here he fancied that he found a similitude to the divisions of the octave in music. These were the dreams of this ingenious man, which he was so fond of that, hearing of the discovery of four new planets (the satellites of Jupiter) by Galileo, he owns that his first reflections were from a concern how he could save his favourite scheme, which was threatened by this addition to the number of the planets. The same attachment led him into a wrong judgment concerning the sphere of the fixed stars: for, being obliged, by his doctrine, to allow a vast superiority to the sun in the universe, he restrains the fixed stars within very narrow limits. Nor did he consider them as suns, placed in the centres of their several systems, having planets revolving round them, as the other followers of Copernicus have concluded them to be, from their having light in themselves, from their immense distances, and from the analogy of nature. Not contented with these harmonies, which he had learned from the observations of Tycho, he gave himself the liberty to imagine several other analogies, that have no foundation in nature, and are overthrown by the best observations. Thus, from the opinions of Kepler, though most justly admired, we are taught the danger of espousing principles, or hypotheses, borrowed from the abstract sciences, and of applying them with such freedom to natural inquiries.

A more recent instance of this fondness for discovering analogies between matters of abstract speculation and the constitution of nature, we find in Huygens, one of the greatest geometers and astronomers any age has produced: when he had discovered that satellite of Saturn which from him is still called the Huygenian satellite, this, with our moon, and the four satellites of Jupiter, completed the number of six secondary planets then discovered in the system; and because the number of primary planets was also six, (and this number is called by mathematicians a perfect number, being equal to the sum of its aliquot parts, 1, 2, 3,); Huygens was hence induced to believe that the number of the planets was complete, and that it was in vain to look for any more. This is not mentioned to lessen the credit of this great man, who never perhaps reasoned in such a manner on any other occasion; but only to shew, by another instance, how ill-grounded reasonings of this kind have always proved. For, not long after the celebrated Cassini discovered four more satellites about Saturn, not to mention the two more that have lately been discovered to that planet by Dr. Herschel, with another new primary planet and its two satellites, besides many others, of both sorts, as yet unknown, which possibly may belong to our system. The same Cassini having found that the analogy, discovered by Kepler, between the periodic times and the distances from the centre, takes place in the lesser systems of Jupiter and Saturn, as well as in the great solar system; his observations overturned that groundless analogy which had been imagined between the number of the planets, both primary and secondary, and the number six; but established, at the same time, that harmony in their motions, which will afterwards appear to flow from one real principle extended over the universe.

But to return to Kepler; his great sagacity, and continual meditations on the planetary motions, suggested to him some views of the true principles from which these motions flow. In his preface to the Commentaries concerning the planet Mars, he speaks of gravity as of a power that was mutual between bodies, and tells us, that the earth and moon tend

towards each other, and would meet in a point, so many times nearer to the earth than to the moon as the earth is greater than the moon, if their motions did not hinder it. He adds, that the tides arise from the gravity of the waters towards the moon. But not having notions sufficiently just of the laws of motion, it seems he was not able to make the best use of these thoughts; nor does it appear that he adhered to them steadily, since in his epitome of astronomy, published many years after, he proposes a physical account of the planetary motions, derived from different principles.

He supposes, in that treatise, that the motion of the sun on his axis is preserved by some inherent vital principle; that a certain virtue, or immaterial image of the sun, is diffused with his rays into the ambient spaces, and, revolving with the body of the sun on his axis, takes hold of the planets, and carries them along with it in the same direction; like as a load-stone turned round near a magnetic needle, makes it turn round at the same time. The planet, according to him, by its inertia, endeavours to continue in its place, and the action of the sun's image and this inertia are in a perpetual struggle. He adds, that this action of the sun, like his light, decreases as the distance increases; and therefore moves the same planet with greater celerity when nearer the sun, than at a greater distance. To account for the planet's approaching towards the sun, as it descends from the aphelion to the perihelion, and receding from the sun while it ascends to the aphelion again, he supposes that the sun attracts one part of each planet, and repels the opposite part; and that the part attracted is turned towards the sun in the descent, and the other towards the sun in the ascent. By suppositions of this kind he endeavoured to account for all the other varieties of the celestial motions.

But, now that the laws of motion are better known than in Kepler's time, it is easy to shew the fallacy of every part of this account of the planetary motions: The planet does not endeavour to stop in consequence of its inertia, but to persevere in its motion in a right line. An attractive force makes it descend from the aphelion to the perihelion in a curve concave towards the sun: but the repelling force, which he supposed to begin at the perihelion, would cause it to ascend in a figure convex towards the sun. There will be occasion to shew afterwards, from Sir Isaac Newton, how an attraction or gravitation towards the sun alone produces the effects, which, according to Kepler, required both an attractive and repelling force; and that the virtue which he ascribed to the sun's image, propagated into the planetary regions, is unnecessary, as it could be of no use for this effect, though it were admitted. For now his own prophecy, with which he concludes his book, is verified; where he tells us, that "the discovery of such things was reserved for the succeeding ages, when the author of nature would be pleased to reveal these mysteries."

The works of this celebrated author are many and valuable; as, 1. His *Cosmographical Mystery*, in 1596. 2. *Optical Astronomy*, in 1604. 3. *Account of a New Star in Sagittarius*, 1605. 4. *New Astronomy*; or, *Celestial Physics*, in Commentaries on the planet Mars. 5. *Dissertations*; with the *Nuncium Siderius* of Galileo, 1610. 6. *New Gauging of Wine Casks*, 1615. Said to be written on occasion of an erroneous measurement of the wine at his marriage by the revenue officer. 7. *New Ephemerides*, from 1617 to 1620. 8. *Copernican System*, three first books of the, 1618. 9. *Harmony of the World*; and three books of *Comets*, 1619. 10. *Cosmographical Mystery*, 2d edit. with Notes, 1621. 11. *Copernican Astronomy*; the three last books, 1622. 12. *Logarithms*, 1624; and the *Supplement*, in 1625. 13. His *Astronomical Tables*, called the *Rudolphine Tables*, in honour of the Emperor Rudolphus, his great and learned patron, in 1627. 14. *Epitome of the Copernican Astronomy*, 1635. Beside these, he wrote se-

veral pieces on various other branches, as *Chronology*, *Geometry of Solids*, *Trigonometry*, and an excellent treatise of *Dioptrics*, for that time.

KEPLER'S *Laws* are those laws of the planetary motions discovered by Kepler. These discoveries in the mundane system are commonly accounted two, viz. 1st, That the planets describe about the sun areas that are proportional to the times in which they are described, namely, by a line connecting the sun and planet; and 2d, That the squares of the times of revolution are as the cubes of the mean distances of the planets from the sun. Kepler discovered also that the orbits of the planets are elliptical.

These discoveries of Kepler, however, were only found out by many trials, in searching among a great number of astronomical observations and revolutions, what rules and laws were found to obtain. On the other hand, Newton has demonstrated, *a priori*, all these laws, shewing that they must obtain in the mundane system, from the laws of gravitation and centripetal force; viz. the first of these laws resulting from a centripetal force urging the planets towards the sun, and the 2d, from the centripetal force being in an inverse ratio of the square of the distance. And the elliptic form of the orbits, from a projectile force regulated by a centripetal one.

KEPLER'S *Problem* is the determining the true from the mean anomaly of a planet, or the determining its place, in its elliptic orbit, answering to any given time; and so named from the celebrated astronomer Kepler, who first proposed it. The general state of the problem is this: To find the position of a right line, which, passing through one of the foci of an ellipsis, shall cut off an area which shall be in any given proportion to the whole area of the ellipsis; which results from this property, that such a line sweeps areas that are proportional to the times. Many solutions have been given of this problem, some direct and geometrical, others not: viz. by Kepler, Bulliald, Ward, Newton, Keill, Machin, &c. See Newton's Princip. lib. 1, prop. 31, Keill's Astron. Lect. 23, Philos. Trans. abr. vol. 8. p. 73, &c.

In the last of these places, Mr. Machin observes, that many attempts have been made at different times, but with no great success, towards the solution of the problem proposed by Kepler: To divide the area of a semicircle into given parts, by a line drawn from a given point in the diameter, in order to find an universal rule for the motion of a body in an elliptic orbit. For, among the several methods offered, some are only true in speculation, but are really of no service; others are not different from his own, which he judged improper. And as to the rest, they are also limited and confined to particular conditions and circumstances, as still to leave the problem in general untouched. To be more particular; it is evident, that all constructions by mechanical curves are seeming solutions only, but in reality inapplicable; that the roots of infinite series are, on account of their known limitations in all respects, so far from being sufficient rules, that they serve for little more than exercises in a method of calculation. And then, as to the universal method, which proceeds by a continued correction of the errors of a false position, it is no method of solution at all in itself; because, unless there be some antecedent rule or hypothesis to begin the operation (as suppose that of an uniform motion about the upper focus, for the orbit of a planet; or that of a motion in a parabola for the perihelion part of the orbit of a comet, or some other such), it would be impossible to proceed one step in it. But as no general rule has ever yet been laid down, to assist this method, so as to make it always operate, it is the same in effect as if there were no method at all. And accordingly in experience it is found, that there is no rule now subsisting but what is absolutely useless in the elliptic orbits of comets; for in such cases there is no other way

to proceed but that which was used by Kepler: to compute a table for some part of the orbit, and in it examine if the time to which the place is required, will fall out any where in that part. So that, upon the whole, it appears evident, that this problem, contrary to the received opinion, has never yet been advanced one step towards its true solution.

Mr. Machin then proceeds to give his own solution of this problem, which is particularly necessary in orbits of a great eccentricity; and he illustrates his method by examples for the orbits of Venus, of Mercury, of the comet of the year 1682, and of the great comet of the year 1680, sufficiently shewing the universality of the method.

KERATOPHYTUM, in natural history, a species of *GORGONIA*. The keratophyta are called the *frutices coralloides*, or sea shrubs; and generally known among naturalists by the different appellations of *litophyta*, *lithoxyla*, and *keratophyta*; epithets tending to convey an idea of their composition, which at first view seems to consist partly of a woody or horny, partly of a stony or calcareous substance, variously disposed with respect to each other. Their general form approaches to that of shrubs, having a root-like base, by which they adhere to some solid support in the ocean; and a stem or trunk, and branches differently disposed; some rising up in one or more different twigs, subdivided into smaller and separate ramifications; while others have their smaller branches connected in such a manner, as to form a curious net-like structure: from this diversity of figure they borrow the names of *sea-fans*, *sea-feathers*, &c. The seeming fibres of the base are, in reality, small tubes, of which the whole shrub consists: these tubes run up longitudinally into the trunk, and are also circularly disposed about the centre of the trunk: the woody part, as naturalists have called it, thus formed, affords when burnt a strong smell like burning horn; whence some have called it *the horny part*. Upon this part is superinduced a kind of stony or calcareous coat, which covers both trunk and branches to their extremities. In this coat may be discovered regular orders or pores of cells; and viewed by the microscope, it always appears to be an organical body consisting of a regular congeries, like the cells in which animals have been formed or existed. Some of this kind of bodies have lost their calcareous covering by the violence of the waves and other accidents. In some specimens of an advanced growth, the calcareous tubes just mentioned send out little cells of animals of the polype kind, with proper openings to them all: these cells are diffused along the branches in some regular order, much in the same manner as they are in the corallines. From the cells the animals have been discovered extending themselves, as well to procure food as materials for the increase of this surprising structure; and therefore there is no reason to doubt that they are animal productions.

A small sprig of the keratophyton flabelliforme, or warded sea-fan, is represented in Vol. II. pl. 8. fig. 7. The outside is covered with a crust full of little lumps like warts; which, when dissolved in vinegar, discover the contracted bodies of polypes, like claws. C and C₁ are two views of one of the warts magnified; C₂ is the appearance of the polype when the cretaceous matter is dissolved; C₃ represents the particles that compose the incrustation, magnified.—D represents a sea-willow, or keratophyton dichotomum. On both edges of the flat branches are regular rows of little rising cells in the calcareous part, with small holes for an entrance to each. See **CORALLINES**.

KERCRING (THEODORF), a famous physician of the 17th century, was born at Amsterdam, and acquired a great reputation by his discoveries and his works. He found out the secret of softening amber without depriving it of its transparency; and made use of it in covering the bodies of curious insects in order to preserve them. He was a member of the Royal Society of London, and died in 1693 at Hamburgh, where he

had spent the greatest part of his life, with the title of *Resident of the Grand duke of Tuscany*. His principal works are, 1. *Spicilegium anatomicum*. 2. *Anthropogenice ichnographiæ*. There is also attributed to him an anatomical work, printed in 1671 in folio.

KERCOLANG, an island of Asia, in the Indian Ocean. It is between 80 and 100 miles in circumference, and, in general, of a very good height. The face of the country seems to be steep hills and extensive valleys, and every part to be covered with trees and verdure, with some pleasant cultivated grounds. The houses stand on posts, and appear to be well-built, and neatly thatched. Their fishing-hooks and lines are mostly European; and the inhabitants are Malays. Their clothing, in general, is made of a coarse kind of calico, though some wear silk, and most of them have a kind of turban round their head; and a few have been seen with a Chinese pointed hat. They are a mild and apparently quiet people: and the confidence they put in strangers proves that the latter are not unwelcome guests. E. lon. 126. 31. N. lat. 4. 28.

KERGUELEN'S LAND, an island in the Southern Ocean, visited by captain Cook in 1779. From its sterility, it might properly have been called the island of Desolation: but captain Cook was unwilling to rob M. Kerguelen of the honour of its bearing his name. Mr. Anderson, who accompanied captain Cook in this voyage, says, that no place hitherto discovered in either hemisphere affords so scanty a field for the naturalist as this spot. Some verdure indeed appeared, when at a small distance from the shore, which might raise the expectation of meeting with a little herbage; but all this lively appearance was occasioned by one small plant, resembling saxifrage, which grew upon the hills in large spreading tufts, on a kind of rotten turf, which, if dried, might serve for fuel, and was the only thing seen here that could possibly be applied to that purpose. E. lon. 69. 37. S. lat. 49. 3.

KERI-CETIB are various readings in the Hebrew Bible: *keri* signifies that which is read; and *cetib* that which is written. For where any such various readings occur, the wrong reading is written in the text, and that is called the *cetib*; and the true reading is written in the margin with *p* under it, and called the *keri*. It is generally said by the Jewish writers, that these corrections were introduced by Ezra; but it is most probable, that they had their original from the mistakes of the transcribers after the time of Ezra, and the observations and corrections of the Masorites. Those Keri-cetibs which are in the sacred books written by Ezra himself, or which were taken into the canon after his time, could not have been noticed by Ezra himself; and this affords a presumption, that the others are of late date. These words amount to about 1000; and Dr. Kennicott, in his *Dissertatio Generalis*, remarks, that all of them, excepting 14, have been found in the text of manuscripts.

KERMAN, a province of Persia, lying on the gulph of Persia. Here are sheep, which, after grazing from January to May, have their fleeces fall off their backs, and become as naked as sucking pigs; and the inhabitants drive a great trade in their wool. Kerman is the capital.

KERMAN, a town of Persia, capital of a province of the same name. It is 120 miles N. of Gombroon. E. lon. 57. 55. N. lat. 29. 40.

KERMES, in zoology, the name of an insect produced in the excrescences of a species of the oak. See **COCCUS**.

KERMES Mineral, so called from its colour, which resembles that of vegetable kermes, is one of the most important antimonial preparations, both with regard to its chemical phenomena and to its medicinal uses. The use of kermes-mineral was not established in medicine before the beginning of this century. Some chemists, indeed, amongst others Glauber and Lemery,

had before that time mentioned in their works several preparations of antimony which approach more or less to kermes; but these preparations, being little known, were confounded with many others which are entirely neglected, although much praised by their authors. The fame of kermes was occasioned by friar Simon, apothecary to the Chartreux friars. He received this preparation from a surgeon called *La Ligerie*, who had procured it from a German apothecary who had been a scholar of the famous Glauber. Friar Simon, from the commendations given to this new remedy by *La Ligerie*, administered it to a Chartreux friar, who was dangerously ill of a violent peripneumony, by which the friar was suddenly, and as it had been miraculously, cured. From that time the friar-apothecary published the virtue of his remedy. Several other remarkable cures were performed by means of kermes. The public believed in its medicinal qualities, and called it *powder of Chartreux*; because it was prepared only in the apothecary's shop belonging to these monks. The reputation of kermes extended itself more and more; till at length the duke of Orleans, then regent of France, procured the publication of the process by *La Ligerie*.

This process consists in boiling, during two hours, pulverised crude antimony in the fourth part of its weight of the liquor of nitre fixed by coals, and twice its weight of pure water: at the end of this time the liquor is to be decanted, and filtrated, while boiling, through brown paper. It continues clear while it is boiling-hot; but when it cools, it becomes turbid, acquires a red brick colour, and again becomes clear by the deposition of a red sediment, which is the kermes. The boiling may be thrice repeated, and each time the same quantity of water is to be added to the antimony, and a fourth part less of the liquor of fixed nitre. The several sediments from these three boilings are to be added together, washed with clean water till the water acquires no taste; and the kermes is then to be dried. *La Ligerie* directs, that aquavitæ shall be once or twice poured upon it and burnt, and the kermes dried again.

We now proceed to explain the nature of kermes, and the phenomena of its preparation. Crude antimony is composed of regulus of antimony and common sulphur, united naturally with each other, as in almost all metallic minerals. The fixed alkali with which the crude antimony is boiled, although it is diluted with much water, acts upon the sulphur of the antimony, and forms with it liver of sulphur: and as this compound is a solvent of all metallic matters, it dissolves a certain quantity of the regulus of antimony. In this operation then a combination is formed of fixed alkali, of sulphur, and of regulus of antimony. Of these three substances the fixed alkali only is soluble in water, and is the intermediate substance by which the sulphur and regulus are suspended in the water. But we are to observe, that the alkali becomes impregnated by this operation, and by boiling, with a larger quantity of regulus, and especially of sulphur, than can be suspended in cold water: hence the decoction of kermes, which is clear, limpid and colourless while boiling-hot, becomes turbid and deposits a sediment while it cools. This compound, therefore, like certain salts, may be kept dissolved in larger quantity by hot than by cold water, and much of it is therefore deposited by cooling.

Further, while the kermes is precipitating, the whole antimoniated liver of sulphur, which is dissolved by the boiling liquor, may be divided into two parts; one of which, [that is the kermes, being overcharged with the regulus, and particularly with the sulphur, contains but a little alkali, which it draws along with it during its deposition. The other part, as it contains much more alkali, remains dissolved even in the cold liquor, by means of this larger quantity of alkali.

All these propositions are to be explained and demonstrated

by the following observations: *First*, when the decoction of kermes is cold, and has formed all its sediment, if, without adding any thing to it, it be heated till it boil, it again entirely redissolves the kermes; the sediment disappears; the liquor becomes clear, and by cold is again rendered turbid and deposits sediment as before. Thus the kermes may be made to precipitate and to redissolve as often as we please. *Secondly*, by digesting kermes in aqua regia, which dissolves its alkali and regulus, the sulphur is separated pure. The acids of aqua regia form a nitre and a febrifugal salt of Sylvius with the alkali of the kermes; and if a certain quantity of kermes be melted with black flux after having destroyed its sulphur by roasting, a true regulus of antimony may be obtained from it. These experiments, which were made by Mr. Geoffroy, and the detail of which is found in memoirs given to the Academy in the years 1734 and 1735, upon the analysis of kermes, show evidently the presence of sulphur, of fixed alkali, and of regulus of antimony, in this compound. From Mr. Geoffroy's experiments we find, that 72 grains of kermes contain about 16 or 17 grains of regulus, 13 or 14 grains of alkaline salt, and 40 or 41 grains of common sulphur. *Thirdly*, by repeating the boiling of the liquor upon the antimony, more and more kermes will be formed each time by cooling, as at first; and this experiment may be repeated a great many times. Mr. Geoffroy says, that he repeated it 78 times without any other addition than that of pure water to supply that which was lost by evaporation; and that each time a considerable quantity of kermes was formed by cooling. This experiment proves, that the alkali transforms the antimony into kermes by overcharging itself with regulus and sulphur, and at each precipitation the kermes does not retain and take with it but a very small quantity of alkali. *Fourthly*, if any acid be poured upon the liquor in which the kermes has been formed, and from which it has been entirely separated by cooling, Mr. Baumé has observed, that this liquor is again rendered turbid, and that a second sediment is formed of a yellow-reddish colour, which is nothing else than golden sulphur of antimony; that is, regulus of antimony and sulphur mixed together, but in very different proportions, and with very different strengths of union, from those in which they are found in the crude antimony.

After this precipitation, in the liquor a neutral salt is left, which is formed by the contained alkali and the precipitating acid. From this experiment we find, that in the liquor from which the kermes has been deposited, a considerable quantity of antimoniated liver of sulphur remains, which differs from kermes by containing a much larger proportion of alkali; so that it can keep dissolved the regulus and sulphur with which it is united, even when the liquor is cold.

In the process for several antimonial preparations, a kermes, or compounds like it, is formed. This always happens when crude antimony is treated by fusion with a quantity of alkaline salt, so that an antimoniated liver of sulphur results from it, overcharged with regulus and sulphur; that is, containing more of these two substances than it can keep dissolved in cold water. If any of these combinations be boiled in water, a matter analogous to kermes is always deposited by cooling. This happens, for instance, to the scoria of the regulus of antimony, and in an operation described by Mr. Geoffroy to abridge the process for making kermes by fusion.

To make kermes by fusion, Mr. Geoffroy fuses two parts of antimony with one part of alkaline salt; he powders this matter while yet hot, and keeps it during two hours in boiling water; he then filtrates it, and receives the liquor into more boiling water, from which, when it cools, about six gros of kermes is deposited, when an ounce of antimony has been used. This method of making kermes is much more expeditious, but less perfect; for, as the author himself confesses, the kermes pro-

duced is not so fine and soft as that made in the ordinary method.

Mr. Lemery the elder mentions also, in his Treatise concerning Antimony, an operation from which his son pretends that kermes may be obtained. This operation consists in digesting, and afterwards boiling, powdered crude antimony in a very pure liquor of fixed nitre. This liquor, if it be in sufficient quantity, is capable of dissolving quickly and entirely powdered crude antimony; and we cannot doubt but that, by cooling, a considerable quantity of a substance very analogous to kermes will be produced. Nevertheless, none of these short methods of making kermes is directed by dispensatories, or by the best books for describing the preparation of chemical remedies.

Kermes is used in medicine only; and from it singularly excellent effects may be produced, when administered by able physicians. In kermes are united the exciting and evacuant virtues of the emetic preparations of antimony, with the tonic, dividing, aperitive, and resolving properties of the liver of sulphur; that is to say, it is capable of answering two principal indications in the treatment of many acute and chronic diseases. Properly managed, it may become an emetic, a purgative, a diuretic, a sudorific, or an expectorant, as is required, and it is always attenuating and resolving. When seven or eight grains are taken at once, it chiefly acts upon the primæ viæ, generally as an emetic and as a purgative. A dose of three or four grains is seldom emetic, and more frequently purgative. When taken in these quantities as an evacuant, a little of it passes also into the viæ secundæ & tertiæ. When it is administered in smaller doses, it passes almost entirely into the lacteal, blood, and lymphatic vessel. In these it occasions such spasms and oscillations as it does in the primæ viæ; so that it increases all secretions and excretions, but particularly those of urine, sweat and expectoration, according to the dose, to the nature of the disease, and to the disposition of the patient. It produces very good effects in those diseases of the breast which proceed from fullness and obstruction.

Kermes may be administered in linctuses, in oily or in cordial potions, in any vehicle; or incorporated in a bolus with other suitable remedies. One precaution, hitherto little observed, is very necessary; that is, not to join it with acids, if it is intended to act as kermes. Anti-acid and absorbent substances ought to be joined with it, if the patient has an acid in the primæ viæ, or an acceſcent disposition; for, as these acids saturate the alkali by which the kermes is rendered an antimoniated liver of sulphur, and by which alone it differs from golden sulphur of antimony, they accordingly render the kermes entirely similar to the golden sulphur of antimony, the properties of which are very different from those of kermes.

KERN, or KERNE, a term in the ancient Irish militia, signifying a *foot-soldier*. Camden tells us, the armies of Ireland consisted of cavalry, called *gall-glaſſes*; and infantry, lightly armed, called *kernes*. The kernes bore swords and darts; to the last were fitted cords, by which they could recover them after they had been launched out.

KERNES, in our laws, signify idle persons or vagabonds.

KERPEN, a town of Germany, in the circle of Westphalia and duchy of Juliers, 14 miles S. E. of Juliers. E. lon. 6. 56. N. lat. 50. 0.

KERRY, a county of Ireland, in the province of Munster, anciently called *Corrigia*, or "the rocky country," from *Cerrig* or *Carrie*, "a rock." It is bounded by the Shannon, which divides it from Clare on the north, by Limerick and Cork on the east, by another part of Cork on the south, and by the Atlantic Ocean on the west. The best town in it is Dingle, situated in a bay of the same name. It comprehends a great part of the territory formerly called *Desmond*, and consists of very different kinds of soil. The south parts are plain and fertile, but

the north full of high mountains, which, though remarkably wild, produce a great number of natural curiosities. It contains 636,905 Irish plantation acres, 84 parishes, 8 baronies, 3 boroughs, returns 8 members to parliament, and gives the title of earl to the family of Fitzmaurice. It is about 57 miles long, 45 broad, and lies within N. lat. 51. 30. and 52. 24; the longitude at the mouth of Kenmare river being 10° 35' west, or 42' 20" difference of time with London. It is the fourth county as to extent in Ireland, and the second in this province; but in respect to inhabitants and culture doth not equal many smaller counties. In it there are two episcopal sees, which have been annexed to the bishopric of Limerick since the year 1660, viz. Ardfert and Aghadoe. The see of Ardfert was anciently called the diocese of *Kerry*, and its bishops were named bishops of *Kerry*. Few mountains in Ireland can vie with those in this county for height; during the greater part of the year their sides are obscured by fogs, and it must be a very serene day when their tops appear. Iron ore is to be had in great plenty in most of the southern baronies. The principal rivers are the Blackwater, Feal, Gale, and Brick, Cashin, Mang, Lea, Fleſk, Laune, Carrin, Partin, Inry, and Roughty, and the principal lake is Killarney. There are some good medicinal waters discovered in this county; particularly Killarney-water, Iveragh Spa, Felloſwel, Dingle, Cattlenain, and Tralee Spas, as also a saline spring at Maherybeg. Some rare and useful plants grow in Kerry, of which Dr. Smith gives a particular account in his history of that county.

KERSEY, a kind of coarse woollen cloth, made chiefly in Kent and Devonshire.

KERTSCH, a fortress, situated on the E. coast of the Crimea, and near the N. entrance of the Straits of Caffa. This fortress and that of Yen'kale are of the greatest importance, as they command the passage which forms the communication between the sea of Azoph and the Black Sea.

KESITAH. This word is to be met with in Genesis and in Job, and is translated in the Septuagint and Vulgate "sheep or lambs." But the Rabbins and modern interpreters are generally of opinion, that *kesitah* signifies rather a piece of money. Bochart and Eugubinus are of opinion the Septuagint meant *mina*, and not lambs; in Greek *κεκατονμνον*, instead of *κεκατον ομνων*. Now a mina was worth 60 Hebrew shekels, and consequently 6l. 6s. 10½d. sterling. M. de Pelletier of Rouen is of opinion, that *kesitah* was a Persian coin, stamped on one side with an archer (*Kesitah* or *Keset'h* in Hebrew signifying "a bow," and on the other with a lamb; that this was a gold coin known in the East by the name of a *daric*, and was in value about 12 livres and 10d. French money. Several learned men, without mentioning the value of the *kesitah*, say it was a silver coin, the impression whereof was a sheep, for which reason the Septuagint and Vulgate translate it by this name. Calmet is of opinion, that *kesitah* was a purse or gold or silver. In the East they reckon at present by purses. The word *kesit* in Chaldee signifies "a measure, a vessel." And Eustathius says, that *kista* is a Persian measure. Jonathan and the Targum of Jerusalem translate *kesitah* "a pearl." (Ger. xxxiii. 19; Job xli. 11.) Or 9l. English, supposing, as Dr. Prideaux does, that a shekel is worth 3s. A *daric* is a piece of gold, worth, as Dr. Prideaux says, 25s. English.

KESROAN, a chain of mountains in Asia, on the coast of Syria, which makes a part of Mount Libanus. It is one of the most pleasant countries in the East, as well on account of the goodness of the air, as the excellence of the corn, fruits, and all the necessaries of life.

KESSEL, a town of Upper Guelderland, in the Netherlands, with a handsome castle. It is the chief town in the territory of the same name, and seated on the river Meuse, between Ruremond and Venlo, it being about five miles from

each. It was ceded to the king of Prussia by the treaty of Utrecht. E. lon. 6. 13. N. lat. 41. 22.

KESSEL (John Van), an eminent painter, was born at Antwerp in 1626, and became exceedingly famous for painting those particular objects which he delighted to represent; and not only excelled in fruits and flowers, but was likewise eminent for painting portraits. In this manner he resembled Velvet Brueghel, and very nearly equalled him in his birds, plants and flowers. The prodigious high prices for which he sold his works, occasioned the rich alone to be the purchasers; and the king of Spain admired the performances of Van Kessel to such a degree, that he purchased as many of them as he could possibly procure, till at last he prevailed on that artist to visit his court, where he was appointed painter to the queen, and was retained in her service as long as she lived. He painted portraits admirably, with a light free touch, and a tone of colour that very much resembled Vandyck; nor are his works in that style considered in Spain as inferior to that great master. He died in 1708. aged 82.

KESSELDORF, a village of Germany, in the circle of Upper Saxony, three miles below Dresden, remarkable for the battle gained by the king of Prussia over the Saxons, on the 15th of December 1745.

KESTEVEN, one of the three divisions of Lincolnshire, containing the western part of the county, from the middle to the southern extremity. It possesses variety of soil; but, on the whole, though intermixed with large heaths, is a fertile country. Part of the fens of Lincolnshire are in this district; the air of which, however, is more salubrious than that of the district of Holland; and the soil, moreover, is more fruitful.

KESTON, a village in Kent, $8\frac{1}{2}$ miles N. W. by N. of Westerham, and 14 S. E. by S. of London. On Holwood Hill, in this parish, is Holwood House, the seat of the right hon. William Pitt, in whose grounds are the remains of a large fortification (probably a Roman one) of an oblong form; the area of which is partly enclosed by rampiers and double ditches of a great height and depth. It is two miles in circumference, inclosing near 100 acres of ground. A path descends from the camp to the springhead of the river Ravensbourn. Of this spring an excellent cold bath was formed, surrounded by pales and trees; but it has been long neglected. This river flows hence through Bromley, Hayes, Beckenham, and Lewisham, and, crossing the great road at Deptford bridge, falls into the Thames below.

KESTREL, the English name of a hawk, called also the *flannel* and the *windbover*, and by authors the *tinnunculus* and *chenvis*. It builds with us in hollow oaks, and feeds on partridges and other birds. See FALCO.

KESWICK, a town of Cumberland, with a market on Saturday; seated in a vale surrounded by hills, near the rapid river Greeta. It was known formerly for its copper mines, which rendered it a considerable place; but it now consists only of one long street. It is 25 miles N. W. by N. of Kendal, and 287 N. N. W. of London. W. lon. 3. 16. N. lat. 58. 35.

Keswick, Vale of, a delightful spot in the southern part of Cumberland, lately much visited by the admirers of nature. Here is the lake of Keswick, or, more properly, the lake of Derwent-water. To the N. of this romantic piece of water soars the lofty mountain Skiddaw, one of the most distinguished in England, and the haunt of eagles and other birds of prey. To the S. is the dreary region of Borrowdale. The water of the Derwent-water is subject to violent agitations, and often without any apparent cause. It has one peculiar characteristic; namely, that it retains its form, viewed from any point, and never assumes the appearance of a river. See BORROWDALE, DERWENT-WATER, and SKIDDAW.

KETCH, a vessel equipped with two masts, viz. the main-

mast and mizen-mast, and usually from 100 to 250 tons burden. Ketches are principally used as yachts or as bomb-vessels; the former of which are employed to convey princes of the blood, ambassadors, or other great personages, from one part to another; and the latter are used to bombard citadels, towns, or other fortresses. The bomb-ketches are therefore furnished with all the apparatus necessary for a vigorous bombardment; they are built remarkably strong, as being fitted with a greater number of *riders* than any other vessel of war; and indeed this reinforcement is absolutely necessary to sustain the violent shock produced by the discharge of their mortars, which would otherwise in a very short time shatter them to pieces.

KETTERING, a town of Northamptonshire, with a market on Friday. It is pleasantly seated on an ascent, and is a pretty good place, with a session-house for the justices, where they sometimes meet. It is 12 miles N. E. of Northampton, and 75 N. W. of London. E. lon. 0. 59. N. lat. 52. 20.

KETTLE, in the art of war, a term the Dutch give to a battery of mortars, because it is sunk under ground.

KITTLE-Drums, are formed of two large basins of copper or brass, rounded at the bottom, and covered over with vellum or goat-skin, which is kept fast by a circle of iron, and by several holes fastened to the body of the drum, and a like number of screws to screw up and down, and a key for that purpose. The two basins are kept fast together by two straps of leather, which go through two rings, and are fastened the one before and the other behind the pommel of the kettle-drum's saddle. They have each a banner of silk or damask, richly embroidered with the sovereign's arms or with those of the colonel, and are fringed with silver or gold; and, to preserve them in bad weather, they have each a cover of leather. The drum-sticks are of crab tree or of any other hard wood, eight or nine inches long, with two knobs on the ends, which beat the drum-head and cause the sound. The kettle-drum with trumpets is the most martial sound of any. Each regiment of horse has a pair.

KETTLE-Drummer, a man on horseback appointed to beat the kettle-drums, from which he takes his name. He marches always at the head of the squadron, and his post is on the right when the squadron is drawn up.

KETTLEWELL (JOHN), a learned divine, born in 1653, was descended from an ancient family in the North-riding of Yorkshire, bred in Edmund Hall Oxford, and elected fellow of Lincoln-College. In 1675 he went into orders; but after the Revolution was deprived of his living, on account of his refusal to take the oaths to King William and Queen Mary. He died of a consumption in 1695. He published several works, which were collected and reprinted together in 1718, in 2 vols. folio. He was a man of great candour, meekness, piety, and charity.

KEVELS, in ship-building, a frame composed of two pieces of timber, whose lower ends rest in a sort of step or foot, nailed to the ship's side, from whence the upper ends branch outward into arms or horns, serving to belay the great ropes by which the bottoms of the main sail and fore sail are extended.

KEW, a village of Surry, on the banks of the Thames, about seven miles W. by S. of London. It was formerly a hamlet to Kingston; but in 1767 an act of parliament was obtained, forming Kew and Petersham into one vicarage. Here is Kew House, a royal palace, celebrated for its fine gardens, and his majesty's exotic garden. The last has been brought to great perfection by the introduction of many new plants from Africa and New South Wales; and is known throughout all Europe by the late Mr. Aiton's Hortus Kewensis. From Kew to Brentford is a handsome stone bridge of seven arches over the Thames, built, in 1787, from a design of the late Mr. Painé. Kew gardens are open to the public, every Monday, from midsummer to the end of autumn.

KEXHOLM, that part of Finland which borders upon Russia. The lake Ladoga crosses it, and divides it into two parts. By the treaty between Russia and Sweden in 1721, the Swedes were obliged to abandon the best part to the Russians. The country in general is full of lakes and marshes, thinly inhabited, and badly cultivated. The lake above mentioned is 120 miles in length, and full of fish.

KEXHOLM, or *Carelgorod*, a town of Russia, in a territory of the same name, not very large, but well fortified, and has a strong castle. The houses are built with wood. It formerly belonged to the Russians, after which the Swedes had possession of it for a whole century; but it was retaken by the Russians in 1710. Near it is a considerable salmon-fishery. It is seated on two islands on the north-west side of the lake Ladoga, in E. lon. 30. 25. N. lat. 61. 12. Near it is another town called *New Kexholm*.

KEY, an instrument for the opening of locks. See **LOCK**. J. Molinus has a treatise on keys, *De clavibus veterum*, printed at Upsal: he derives the Latin name *clavis* from the Greek *κλειω κλειδο*, "I shut;" or from the adverb *clim* "privately;" and adds, that the use of keys is yet unknown in some parts of Sweden. The invention of keys is owing to one Theodore of Samos, according to Pliny and Polydore Vergil: but this must be a mistake, the use of keys having been known before the siege of Troy; mention even seems made of them in the 19th chapter of Genesis.

Molinus is of opinion, that keys at first only served for the untying certain knots, wherewith they anciently secured their doors: but the Laconic keys, he maintains, were nearly akin in use to our own; they consisted of three single teeth, and made the figure of an E; of which form there are still some to be seen in the cabinets of the curious. There was another key called *βαλαναργα*, made in the manner of a male screw; which had its corresponding female in a bolt affixed to the door. *Key* is hence become a general name for several things serving to shut up or close others.

KEY, or *Key-stone*, of an *Arch* or *Vault*, is the last stone placed a-top thereof; which being wider and fuller at the top than bottom, wedges, as it were, and binds all the rest. The key is different in the different orders: in the Tuscan and Doric it is a plain stone, only projecting; in the Ionic it is cut and waved somewhat after the manner of consoles; in the Corinthian and Composite it is a console enriched with sculpture, foliages, &c.

KEY is also used for ecclesiastical jurisdiction; particularly for the power of excommunicating and absolving. The Romanists say, the pope has the power of the keys, and can open and shut Paradise as he pleases; grounding their opinion on that explication of Jesus Christ to Peter, "I will give thee the keys of the kingdom of heaven." In St. Gregory we read, that it was the custom heretofore for the popes to send a golden key to princes, wherein they inclosed a little of the filings of St. Peter's chains kept with a world of devotion at Rome; and that these keys were worn in the bosom, as being supposed to contain some wonderful virtues.

KEY is also used for an index or explanation of a cipher. See **CIPHER**.

KEYS of an *Organ*, *Harpsichord*, &c. little pieces of ivory in the fore part of these instruments, by means whereof the jacks play, so as to strike the strings. These are in number 28 or 29. In large organs there are several sets of these keys, some to play the secondary organ, some for the main body, some for the trumpet, and some for the echoing trumpet, &c.: in some there are but a part that play, and the rest are only for ornament. There are 20 intervening black keys, which make half-notes. See the article **ORGAN**, &c.

KEY, in music, a certain fundamental note or tone, to which

the whole piece, be it in cantata, sonata, concerto, &c. is accommodated, and with which it usually begins, but always ends.

KEY, or *Quay*, a long wharf, usually built of stone, by the side of a harbour or river, and having several storehouses for the convenience of lading and discharging merchant ships. It is accordingly furnished with posts and rings, whereby they are secured; together with cranes, capsterns, and other engines, to lift the goods into or out of the vessels which lie along side. The verb *cajare*, in old writers, according to Scaliger, signifies, to *keep in* or *restrain*; and hence came our term *key* or *quay*, the ground where they are made being bound in with planks and posts.

KEYS are also certain sunken rocks lying near the surface of the water, particularly in the West-Indies.

KEYNSHAM, a town of Somersetshire, 116 miles from London. It is a great thoroughfare in the lower road between Bath and Bristol. They call it proverbially *smoky* Keynsham, and with equal reason they might call it *foggy*. It has a fine large church, a stone bridge of 15 arches over the Avon to Gloucestershire, and another over the river Chew. Its chief trade is malting. It has a charity school, a weekly market, and three fairs.

KEYSER'S PILLS, a celebrated mercurial medicine, the method of preparing which was purchased by the French government, and has since been published by M. Richard.

The first, and what, according to Mr. Keyser, is the most essential operation, consists in separating the mercury very exactly from all heterogeneous matter, by reducing it to an æthiops. This is effected by means of an hydraulic machine, a plan of which Mr. Keyser intended to have given to government before his death; but although he did not live to accomplish his resolution, his family still offer to do it when desired. According to the description given by M. Richard, this machine consists of a number of buckets, in which mercury is triturated with water, till the water acquires a black colour. This water, upon standing, deposits a sediment, which, being dried by a proper heat, is the æthiops required.

The second process consists in revivifying the mercury by distillation, in freeing it from all oily matters by means of quicklime, in detaching this quicklime by repeated washings, and afterwards in drying it by means of a sand heat.

The third operation consists in the reduction of the mercury purified by this process to a red calx, by means of heat. In conducting this operation, Mr. Keyser advises that the mercury be put into glass matrasses, a small quantity only in each. For the proper degree of heat, he directs those who would practise the operation to consult Lemery and other chemists.

The fourth operation is, the dissolution of the calcined mercury, obtained by the former process, in distilled vinegar, by means of triture. A pound of this mercury may be dissolved in eight pints of vinegar, by rubbing it for an hour or two in a mortar, which should be kept solely for that purpose. Care must also be taken that the vinegar be not distilled in a metallic but in a glass vessel.

The fifth process consists in the intimate mixture of this vinegar, impregnated with mercury, with manna. Each pound of the vinegar, containing about two ounces of mercury, will require two pounds of manna. They must be rubbed together upon marble stones till they acquire a uniform consistence, which will be liquid to such a degree as to pass through a hair-cloth, for separating the impurities of the manna. After being managed in this manner, it must be spread upon a marble slab, and left to dry there, without the assistance of fire, till it acquires such a consistence as not to run off upon the table being turned to its side. It must then be placed before the fire, and at the same time moved from one part of the stone to another,

by means of a knife, furnished with a large pliant blade. By this means, it is perfectly prepared for forming the pills.

The sixth and last process consists in the formation of the mass thus prepared into pills. These Mr. Keyser made to weigh either three grains or a grain and a half; the first for robust, the last for delicate constitutions.

To this account given for the preparation of these pills, Mr. Keyser has added some reflections by way of supplement. He observes, that, by the purification of the mercury from distillation, a great quantity of heterogeneous matter is separated from it. This, however, by no means frees it completely from all foreign matter. And, as mercury purified, upon being calcined and dissolved in vegetable acid, is a much more powerful medicine than mercury calcined without purification, he concludes, that repeated purifications would render it still more active.

Another remark which he gives, respects the dissolution of the mercurius calcinatus in the distilled vinegar. He observes, that the mercury thus dissolved may be made to unite with running mercury, and to form a very singular product. He formerly mentioned, that a pound of this mercurius calcinatus was to be dissolved in eight pints of vinegar. If to this be added two pounds of running mercury, and the agitation continued, a substance will arise to the surface in the form of cream. This being removed by the assistance of a wooden spoon, more will continue to rise as long as the agitation is continued. The cream being dried and incorporated with manna, in the proportion of one part of the cream to eight of manna, forms a very useful purgative, and is said to be an effectual remedy against recent venereal complaints, particularly against chancres.

M. Richard concludes his account of Keyser's pills with observing, that he considers it to be, without exception, the most effectual remedy for the venereal disease hitherto discovered. But before entering upon the detail, he remarks, that it is his opinion the process may be much abridged without diminishing the efficacy of the medicine. He judged it proper, however, to deliver to the public the method of preparing the pills in Mr. Keyser's own words; and he has not afterwards pointed out the improvements he proposes.

KEYSLER (JOHN GEORGE), a learned German antiquarian, was born at Thourneau in 1689. After studying at the university of Halle, he was appointed preceptor to Charles Maximilian and Christian Charles, the young counts of Giech Buchau; with whom he travelled through the chief cities of Germany, France, and the Netherlands, gaining great reputation among the learned as he went along, by illustrating several monuments of antiquity, particularly some fragments of Celtic idols lately discovered in the cathedral of Paris. Having acquitted himself of this charge with great honour, he procured, in 1716, the education of two grandsons of Baron Bernstorff, first minister of state to his Britannic majesty as elector of Brunswick-Lunenbourg. However, obtaining leave in 1718 to visit England, he was elected a fellow of the Royal Society for a learned essay *De Dei Nebeleannia numine veterum Walachorum topico*: he gave also an explanation of the ancient monument on Salisbury plain called *Stone henge*, with a Dissertation on the Consecrated Mistletoe of the Druids. Which detached essays, with others of the same kind, he published on his return to Hanover, under the title of *Antiquitates sel Eke Septentrionales et Celticae*, &c. He afterwards made the grand tour with the young barons, and to this tour we owe the publication of his travels; which were translated into English, and published in 1756, in 4 vols. 4to. Mr. Keyser on his return spent the remainder of his life under the patronage of his noble pupils, who committed their fine library and museum to his care, with a handsome income. He died in 1743.

KHARKOF, a government of the Russian empire, formerly

comprised in the government of Ukraina-Slovodskaia. Its capital, of the same name, is seated on the river Uda, which falls into the Donetz.

KHERSON, or CHERSON, the capital of the Russian government of Catharinenslaf. See CHERSON.

KIAM, a great river of China, which takes its rise near the western frontier, crosses the whole kingdom eastward, and falls into the bay or gulph of Nanking a little below that city.

KIANG-SI, a province of China, bounded on the north by that of Kiang-nan, on the west by Hou-quang, on the south by Quang-tong, and on the east by Fo-kien and Tche-kiang. The country is extremely fertile; but it is so populous, that it can scarcely supply the wants of its inhabitants: on this account they are very economical; which exposes them to the sarcasms and raillery of the Chinese of the other provinces: however, they are people of great solidity and acuteness, and have the talent of rising rapidly to the dignities of the state. The mountains are covered with simples; and contain in their bowels mines of gold, silver, lead, iron, and tin: the rice it produces is very delicate, and several barks are loaded with it every year for the court. The porcelain made here is the finest and most valuable of the empire. This province contains 13 cities of the first class, and 78 of the second and third.

KIANG-NAN, a province of China, and one of the most fertile, commercial, and consequently one of the richest in the empire. It is bounded on the west by the provinces of Ho-nan and Hou-quang; on the south by Tche-kiang and Kiang-si; and on the east by the gulph of Nanking; the rest borders on the province of Chan tong. The emperor's long kept their court in this province; but reasons of state having obliged them to move nearer to Tartary, they made choice of Pe-king for the place of their residence. This province is of vast extent; it contains fourteen cities of the first class, and ninety-three of the second and third. These cities are very populous, and there is scarcely one of them which may not be called a place of trade. Large barks can go to them from all parts; because the whole country is intersected by lakes, rivers, and canals, which have a communication with the great river Yang-tse-kiang, which runs through the middle of the province. Silk-stuffs, lacquer-ware, ink, paper, and in general every thing that comes from Nanking, as well as from the other cities of the province, are much more esteemed, and fetch a higher price, than those brought from the neighbouring provinces. In the town of Chang-hai alone, and the villages dependent on it, there are reckoned to be more than 200,000 weavers of common cotton cloths. The manufacturing of these cloths gives employment to the greater part of the women.—In several places on the sea coast there are found many salt-pits, the salt of which is distributed all over the empire. In short, this province is so abundant and opulent, that it brings every year into the emperor's treasury about 32,000,000 taels (or ounces of silver), exclusive of the duties upon every thing exported or imported. The people of this country are civil and ingenious, and acquire the sciences with great facility: hence many of them become eminent in literature, and rise to offices of importance by their abilities alone. This province is divided into two parts, each of which has a distinct governor. The governor of the eastern part resides at Sou-tcheou-fou, that of the western at Nanking-fou. Each of these governors has under his jurisdiction seven *fou* or cities of the first class.

KIBURG, a town of Switzerland, in the canton of Zurich, with a castle. It is seated on the river Theos, 14 miles N. E. of the town of Zurich. E. lon. 8. 46. N. lat. 47. 28.

KID, in zoology, the name by which young goats are called. See GOAT.

KIDDER (Dr. RICHARD), a learned English bishop, was born in Sussex, and bred at Cambridge. In 1689 he was in-

stalled dean of Peterborough; and in 1691 was nominated to the bishopric of Bath and Wells, in the room of Dr. Thomas Ken, who had been deprived for not taking the oaths to king William and queen Mary. He published, 1. The young man's duty. 2. A demonstration of the Messiah, 3 vols. 8vo. 3. A commentary on the five books of Moses, 2 vols. 8vo; and several other pious and valuable tracts. He was killed with his lady in his bed by the fall of a stack of chimneys, at his house, in Wells, during the great storm in 1703. The bishop, in the dissertation prefixed to his commentary on the five books of Moses, having reflected upon Monsieur Le Clerc, some letters passed between them in Latin, which are published by Le Clerc in his *Bibliothèque Choisie*.

KIDDERMINSTER, or KEDDERMINSTER, a town of Worcestershire, seated under a hill on the river Stour, not far from the Severn, 12 $\frac{1}{2}$ miles from London. It is a large town of 1180 houses, with about 6000 inhabitants, who carry on an extensive trade in weaving in various branches. In 1735 a carpet manufactory was established with success, so as to employ in 1772 above 250 looms; and there are upwards of 700 looms employed in the silk and worsted. Above 1600 hands are employed as spinners, &c. in the carpet looms only in the town and neighbourhood; upwards of 1400 are employed in preparing yarn, which is used in different parts of England in carpeting; and it is supposed not less than 2000 are employed in the silk and worsted looms in the town and neighbourhood. The silk manufacture was established in 1755. The town is remarkably healthy, and has also an extensive manufacture of quilting in the loom in imitation of Marseilles quilting. Here is a Presbyterian meeting-house; and they have a handsome church, and two good free-schools, a charity-school, and two almshouses, &c. The town is governed by a bailiff, 12 capital burghesses, 25 common-councilmen, &c. who have a town-hall. It formerly sent members to parliament. By the late inland navigation, it has communication by the junction of the Severn canal with the rivers Mersey, Dee, Ribble, Ouse, Trent, Derwent, Severn, Humber, Thames, Avon, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, York, Lancaster, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c. This parish extends to Bewdley bridge, has a weekly market, and three fairs. W. lon. 2. 15. N. lat. 52. 28.

KIDDERS, those that badge or carry corn, dead victuals, or other merchandize, up and down to sell: every person being a common badger, kidder, lader, or carrier, &c. says the stat. 5 Eliz. cap. 12. And they are called *kiddiers*, 13 Eliz. cap. 25.

KIDDLE, or KIDEL, (*Kidellus*), a dam or weir in a river with a narrow cut in it, for the laying of pots or other engines to catch fish. The word is ancient; for in Magna Charta, cap. 24. we read, *Omnes kidelli deponantur per Thamesiam & Medweyam, & per totam Angliam, nisi per cosleram maris*. And by king John's charter, power was granted to the city of London, *de kidellis amovendis per Thamesiam & Medweyam*. A survey was ordered to be made of the weirs, mills, stanks, and kidells, in the great rivers of England, 1 Hen. IV. Fishermen of late corruptly call these dams *kittles*; and they are much used in Wales and on the sea-coasts of Kent.

KIDDINGTON, a town of Oxfordshire, four miles from Woodstock, and 12 from Oxford. It is situated on the Glym river, which divides the parish in two parts, viz. Over and Nether Kiddington, in the latter of which stands the church. This parish was given by King Offa in 780 to Worcester priory. Here King Ethelred had a palace; in the garden of the manor-house is an antique font brought from Edward the Confessor's chapel at Ilip, wherein he received baptism. In Hill-wood near this place is a Roman encampment in extraordinary preservation, but little noticed.

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KIDNAPPING, the forcible abduction or stealing away of man, woman, or child, from their own country, and sending them into another. This crime was capital by the Jewish law: "He that stealeth a man, and selleth him, or if he be found in his hands, shall surely be put to death." Exod. xxi. 16. So likewise in the civil law, the offence of spiriting away and stealing men and children, which was called *plagium*, and the offenders *plagiarii*, was punished with death. This is unquestionably a very heinous crime, as it robs the king of his subjects, banishes a man from his country, and may in its consequences be productive of the most cruel and disagreeable hardships; and therefore the common law of England has punished it with fine, imprisonment, and pillory. And also the statute 11 and 12 W. III. c. 7. though principally intended against pirates, has a clause that extends to prevent the leaving of such persons abroad as are thus kidnapped or spirited away; by enacting, that if any captain of a merchant vessel shall (during his being abroad) force any person on shore, or wilfully leave him behind, or refuse to bring home all such men as he carried out, if able and desirous to return, he shall suffer three months imprisonment.

KIDNEYS, in anatomy. See ANATOMY.

KIDNEY-BAN. See PHASEOLUS.

KIDWELLY, a town of Carmarthenshire, in S. Wales, with a market on Tuesday. It is seated on a creek of the Bristol Channel, near the mouth of the Towy. From this town a canal has been cut to some collieries, whence coal is brought down and exported. It is eight miles S. of Carmarthen, and 224 W. by N. of London. W. lon. 4. 20. N. lat. 56. 44.

KIEL, a strong, rich, and considerable town of Germany, capital of the duchy of Holstein, with a castle, and a university. It stands upon a small peninsula in a bay of the Baltic, and has a very commodious harbour for ships of the largest size. It is already one of the most commercial places in Holstein; and its trade will be still farther augmented when the inland navigation across the peninsula is finished. By this navigation it is proposed to unite the Northern Sea with the Baltic; and it is to be formed across the duchy of Holstein, by the canal of Kiel, and the river Eyder, which passes by Rendsburg, and falls into the German Ocean at Tonningen. This canal was begun in 1777, has been since finished, and is now opened for the navigation of vessels. Kiel is 37 miles N. W. of Lubec, and 46 N. of Hamburg. E. lon. 10. 0. N. lat. 54. 20.

KIGGELARIA, in botany; a genus of the decandria order, belonging to the diœcia class of plants; and in the natural method ranking under the 37th order, *C. lumnifera*. The male calyx is quinquepartite; the corolla pentapetalous; there are five trilobous glandules; the antheræ are perforated at top; the female calyx and corolla as in the male; there are five styles; the capsule unilocular, quinquevalved, and polyspermous. There is but one species, viz. the *Africana*. It hath an upright woody stem, and purplish branches, growing 15 or 18 feet high; oblong, sawed, alternate leaves; and dioecious, greenish-white flowers, in clusters from the sides of the branches; succeeded by globular, rough fruit, the size of cherries, containing the seeds, which seldom ripen here. As this is a native of warm climates, it must be constantly kept in a stove in this country. It is propagated by seeds, layers, or cuttings, though most readily by seeds.

KIGHLEY, a town in the west riding of Yorkshire, six miles to the south-east of Skipton in Craven. It stands in a valley surrounded with hills, at the meeting of two brooks, which fall into the river Aire one mile below it. Every family is supplied with water brought to or near their doors in stone troughs from a never-failing spring on the west side of it.

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The parish is six miles long and two broad, and is 60 miles from the east and west seas; yet at the west end of it near Camel-Croft is a rising ground, from which the springs on the east side of it run to the east sea, and those on the west to the west sea. By the late inland navigation, this town has a communication with the rivers Mersey, Dee, Ribble, Onse, Trent, Derwent, Severn, Humber, Thames, &c. which navigation, including its windings, extends above 500 miles, in the counties of Lincoln, Nottingham, Lancaster, Westmoreland, Chester, Stafford, Warwick, Leicester, Oxford, Worcester, &c.

KILBARCHAN, a village of Renfrewshire in Scotland, to the N. W. of the lake called Loch Winnoch. It is a manufacturing place, and has several extensive bleaching-grounds. It is about five miles S. W. of Renfrew.

KILBEGGAN, a post, fair, and borough-town of Ireland, in the county of Westmeath and province of Leinster, 44 miles from Dublin. It returns two members to parliament; patronage in the Lambert family. It is seated on the river Brosna, over which there is a bridge. There was here a monastery founded in 1200, and dedicated to the Virgin Mary, and inhabited by monks from the Cistercian abbey of Melefont. The fairs are two.

KILBURN, a village of Middlesex, two miles N. W. by N. of London; famous for a fine well of mineral water.

KILDA (St.), one of the Hebrides or western islands of Scotland. It lies in the Atlantic ocean, about 58. 30. N. lat. and is about three English miles in length from east to west, and its breadth from south to north not less than two. The ground of St. Kilda, like much the greatest part of that over all the Highlands, is much better calculated for pasture than tillage.—Restained by idleness, a fault or vice much more pardonable here than in any other part of Great Britain, or discouraged by the form of government under which they live, the people of the island study to rear up sheep, and to kill wild-fowl, much more than to engage deeply in the more toilsome business of husbandry. All the ground hitherto cultivated in this island lies round the village. The soil is thin, full of gravel, and of consequence very sharp. This, though naturally poor, is, however, rendered extremely fertile, by the singular industry of very judicious husbandmen: these prepare and manure every inch of their ground, so as to convert it into a kind of garden. All the instruments of agriculture they use, or indeed require, according to their system, are a spade, a mall, and a rake or harrow. After turning up the ground with a spade, they rake or harrow it very carefully, removing every small stone, every noxious root or growing weed that falls in their way, and pound down every stiff clod into dust. It is certain that a small number of acres well prepared in St. Kilda, in this manner, will yield more profit to the husbandman than a much greater number when roughly handled in a hurry, as is the case in the other western isles. The people of St. Kilda sow and reap much earlier than any of their neighbours on the western coast of Scotland. The heat of the sun, reflected from the hills and rocks into a low valley facing the south-east, must in the summer time be quite intense; and, however rainy the climate is, the corn must for these reasons grow very fast, and ripen early.

The harvest is commonly over at this place before the beginning of September; and should it fall out otherwise, the whole crop would be almost destroyed by the equinoctial storms. All the islanders on the western coast have great reason to dread the fury of autumnal tempests: these, together with the excessive quantities of rain they have generally throughout seven or eight months of the year, are undoubtedly the most disadvantageous and unhappy circumstances of their lives.

Barley and oats are the only sorts of grain known at St. Kilda; nor does it seem calculated for any other. Fifty bolls

of the former, old Highland measure, are every year brought from thence to Harris; and all the western islands hardly produce any thing so good of the kind. Potatoes have been introduced among that people only of late, and hitherto they have raised but small quantities of them. The only appearance of a garden in this whole land, so the natives call their principal island in their own language, is no more than a very inconsiderable piece of ground, which is enclosed and planted with some cabbages. On the east side of the island, at the distance of a quarter of a mile from the bay, lies the village, where the whole body of this little people (the number amounting in 1764 to no more than 88) live together like the inhabitants of a town or city. It is certain that the inhabitants were much more numerous formerly than at present; and the island, if under proper regulations, might easily support 300 souls. Martin, who visited it about the end of the last century, found 180 persons there; but about the year 1730, one of the people coming to the island of Harris, was seized with the small-pox and died. Unluckily his clothes were carried away by one of his relations next year; and thus was the infection communicated, which made such havock, that only four grown persons were left alive. Their houses are built in two rows, regular, and facing one another; with a tolerable causeway in the middle, which they call the *street*. These habitations are made and contrived in a very uncommon manner. Every one of them is flat in the roof, or nearly so, much like the houses of some oriental nations. That from any one of these the St. Kildans have borrowed their manner of building, no man of sense will entertain a suspicion. They have been taught this lesson by their own reason, improved by experience. The place in which their lot has fallen is peculiarly subject to violent squalls and furious hurricanes: were their houses raised higher than at present, they believe the first winter-storm would bring them down about their ears. For this reason, the precaution they take in giving them roofs much flatter than ordinary seems to be not altogether unnecessary. The walls of these habitations are made of a rough gritty kind of stones, huddled up together in haste, without either lime or mortar, from eight to nine feet high. In the heart of the walls are the beds, which are overlaid with flags, and large enough to contain three persons. In the side of every bed is an opening, by way of door, which is much too narrow and low to answer that purpose. All their dwelling-houses are divided into two apartments by partition-walls. In the division next the door, which is much the largest, they have their cattle stalled during the whole winter season; the other serves for kitchen, hall, and bed-room.

It will be readily expected, that a race of men and women bred in St. Kilda must be a very slovenly generation, and every way inelegant. It is indeed impossible to defend them from this imputation. Their method of preparing a sort of manure, to them indeed of vast use, proves that they are very indelicate. After having burnt a considerable quantity of dried turf, they spread the ashes with the nicest care over the floor of that apartment in which they eat and sleep. These ashes, so exactly laid out, they cover with a rich friable sort of earth; over this bed of earth they scatter a proportionable heap of that dust into which peats are apt to crumble away: this done, they water, tread, and beat the whole compost into a hard floor, on which they immediately make new fires very large, and never extinguished till they have a sufficient stock of new ashes on hand. The same operations are repeated with a never-failing punctuality, till they are just ready to sow their barley; by that time the walls of their houses are sunk down, or, to speak more properly, the floors risen about four or five feet.

To have room enough for accumulating heaps of this compost one above another, the ancient St. Kildans had ingenuity

enough to contrive their beds within the linings of their walls ; and it was for the same reason they took care to raise these walls to an height far from being common in the other western islands. The manure produced in this way must undoubtedly be good ; though probably rather sharp than of long duration, as it is scattered in small quantities upon the surface of the ground. Be that as it will, those who practise this art are abundantly lavish in its praises. They call it a *commodity inestimably precious* ; and one may venture to affirm, that a genuine St. Kildan would scruple to barter it away for all the diamonds in Brasil and Golconda.

It is certain that cleanliness must contribute greatly to health, and of course longevity ; but in spite of that instance of indelicacy now given, and many more which might have been added, the people of this island are not more short-lived than other men. Their total want of those articles of luxury which have so natural a tendency to destroy the constitution of the human body, and their moderate exercises, will, together with some other circumstances, keep the balance of life equal enough between them and those who are absolute strangers to slovenliness.

Besides the dwelling-houses already described, there are a prodigious number of little cells dispersed over all the island ; which consist entirely of stones, without any the smallest help of timber. These cells are from 12 to 18 feet in length, and a little more than seven in height. Every stone hangs above that immediately below, not perpendicularly, but inclines forward, so as to be nearer the opposite side of the grotto, and thus by imperceptible degrees till the two highest courses are near enough to be covered by a single flag at the top. To hinder the rain from falling down between the interstices above, the upper part of the building is overlaid with turf, which looks like a fine green sward while new. The inhabitants secure their peats, eggs, and wild fowl, within these small repositories ; every St. Kildan has his share of them in proportion to the extent of land he possesses, or the rent he pays to the steward. From the construction of these cells, and the toil they must have cost before they could have been finished, it seems plain, that those who put them together were, if not more ingenious than their neighbours in the adjacent islands, at least more industrious than their own successors.

The St. Kilda method of catching wild fowl is very entertaining. The men are divided into fowling-parties, each of which consists generally of four persons distinguished by their agility and skill. Each party must have at least one rope about 30 fathoms long ; this rope is made out of a strong raw cow-hide, salted for that very purpose, and cut circularly into three thongs all of equal length ; these thongs being closely twisted together, form a three-fold cord, able to sustain a great weight, and durable enough to last for about two generations : to prevent the injuries it would otherwise receive from the sharp edges of the rocks, against which they must frequently strike, the cord is cased with sheep-skins, dressed in much the same manner. This rope is a piece of furniture indispensibly necessary, and the most valuable implement a man of substance can be possessed of in St. Kilda. In the testament of a father, it makes the very first article in favour of his eldest son : should it happen to fall to a daughter's share, in default of male heirs, it is reckoned equal in value to the two best cows in the island. By the help of such ropes, the people of the greatest prowess and experience here traverse and examine rocks prodigiously high. Linked together in couples, each having either end of the cord fastened about his waist, they go frequently through the most dreadful precipices : when one of the two descends, his colleague plants himself on a strong shelf, and takes care to have such sure footing there, that if his fellow-adventurer makes a false step, and tumbles over, he may be able to save him. This

method of fowling resembles that of the Norwegians, as described by Pontoppidan.

KILDARE, a county of Ireland, in the province of Leinster, which is 37 miles in length, and 20 in breadth ; and is bounded on the east by Dublin and Wicklow, on the west by King and Queen's county, on the north by East-Meath, and on the south by Catherlough. It is a fine arable country, well watered by the Barrow, Liffey, and other rivers, and well inhabited and cultivated, containing 228,590 Irish plantation acres, 100 parishes, 10 baronies, 4 boroughs, and returns 10 members to parliament. The chief town is of the same name, and gave title of earl to the noble family of Fitzgerald. It was anciently called *Chilledair*, i. e. "the wood of oaks," from a large forest which comprehended the middle part of this county ; in the centre of this wood was a large plain, sacred to heathen superstition, and at present called the *Curragh of Kildare* ; at the extremity of this plain, about the commencement of the 6th century, St. Brigid, one of the heathen vestals, on her conversion to the Christian faith, founded, with the assistance of St. Conlæth, a church and monastery, near which, after the manner of the Pagans, St. Brigid kept the sacred fire in a cell, the ruins of which are still visible.

KILDARE, a town of Ireland, and capital of a county of the same name, is situated 28 miles south-west of Dublin. It returns two members to parliament, patron the duke of Leinster ; and is governed by a sovereign, recorder, and two portreeves. The church of Kildare was very early erected into a cathedral with episcopal jurisdiction, which dignity it retains to this day ; the cathedral, however, has been for several years neglected, and at present is almost in ruins. St. Brigid founded a nunnery at Kildare, which afterwards came into the possession of the regular canons of St. Augustin : this saint died 1st February 523, and was interred here ; but her remains were afterwards removed to the cathedral of Down. In the year 638 *Aod Dubh* or *Black Hugh* king of Leinster abdicated his throne, and took on him the Augustinian habit in this abbey ; he was afterwards chosen abbot and bishop of Kildare, and died on the 10th of May. In 756, Eiglitigin the abbot, who was also bishop of Kildare, was killed by a priest as he was celebrating mass at the altar of St. Brigid ; since which time no priest whatsoever was allowed to celebrate mass in that church in the presence of a bishop. In 1225 Henry de Loundres archbishop of Dublin put out the fire called *inextinguishable*, which had been preserved from a very early time by the nuns of St. Brigid. This fire was however relighted, and continued to burn till the total suppression of monasteries. Here was also a monastery on the south side of the town erected for friars of the Franciscan order, or, as they were more generally called, *Grey friars*, in the year 1260, by Lord William de Vesey ; but the building was completed by Gerald Fitzmaurice, Lord Ossaley. A considerable part of this building yet remains, which appears not to have been of very great extent. A house for White friars was likewise founded in this town by William de Vesey in 1290 ; the round tower here is 130 feet high, built of white granite to about 12 feet above the ground, and the rest of common blue stone. The pedestal of an old cross is still to be seen here ; and the upper part of a cross lies near it on the ground. Four fairs are held here in the year, viz. on 12th February, Easter Tuesday, 1st May, and 9th September.

KILDERKIN, a liquid measure, containing two firkins, or eighteen gallons beer measure, and sixteen ale measure. Two kilderkins make a barrel, and four a hoghead.

KILLIAN (LACUS), an eminent engraver, was a native of Augsburg in Germany, and flourished at the beginning of the 17th century. In what school he learned the art is uncertain ; but his style of engraving bears no small resemblance in many particulars to that of Henry Goltzius, and of John Muller his

disciple. It appears, however, that he went to Italy in order to complete his studies, where he engraved several plates from the pictures of the great Italian masters. According to Mr. Strutt, few artists have manifested a greater command of the graver than Kilian, whether we consider the facility with which the strokes are turned upon each other, or the firmness with which they are executed; and one cannot help admiring it, though it evidently strikes us, that by paying too close attention to this part of the art, he neglected the correctness of his outlines, and fatigued the lights with unnecessary work; by which means he broke the masses, and often totally destroyed the effect of his prints. The naked parts of the human figure are seldom well expressed; the extremities especially are in general very heavy, and sometimes incorrect. Upon the works of this master, however, it appears, that Balechou, so famous for his skill in handling the graver, formed his taste. His works are exceedingly numerous. The time of his death is not any where mentioned. There were several other engravers of the same name and family; but of too inferior merit to deserve particular notice.

KILIANUS (CORNELIUS), a native of Brabant, distinguished himself as an excellent corrector of the press at the printing house of Plantin for 50 years. He likewise wrote several books, which are esteemed. His *Apology for Correctors against Authors*, an epigram of 18 verses, is a proof of his abilities in Latin poetry.

KILKENNY, a county of Ireland, in the province of Leinster, bounded on the south by the county of Waterford, on the north by the Queen's county, on the west by the county of Tipperary, on the east by the counties of Wexford and Catherlough, and on the north-west by Upper Ossory. The greatest length of this county from north to south is 38 miles, the breadth from east to west 18; and it contains 10 baronies. It is one of the most healthful, pleasant, and populous counties of Ireland. It contains 287,650 Irish plantation acres, 96 parishes, 9 baronies, and 7 boroughs, and returns 16 members to parliament. Gilbert Clare, Earl of Gloucester and Hereford, marrying Isabella, one of the daughters and co-heiresses of William Earl Marshal, received as her dower the county of Kilkenny.

KILKENNY, the capital of a county of the same name in Ireland, situated in the province of Leinster, 5 miles south-west of Dublin. It takes its name from the cell or church of Canic, who was an eminent hermit in this country; and is one of the most elegant cities in the kingdom. It is the seat of the bishop of Ossory, which was translated from Agabo in Ossory, about the end of Henry II's reign, by bishop O'Dulany. The city is pleasantly situated on the Nore, a navigable river that discharges itself into the harbour of Waterford. It is said of Kilkenny, that its air is without fog, its water without mud, its fire without smoke, and its streets paved with marble. The two latter are indeed matter of fact; for they have in the neighbourhood a kind of coal that burns from first to last without smoke, and pretty much resembles the Welsh coal. Most of the streets also are actually paved with a very good sort of black marble, of which they have large quarries near the town, which takes a fine polish, and is beautifully intermixed with white granite. The air too is good and healthy, though not remarkably clearer than in many other parts of the kingdom. The city is governed by a mayor, recorder, alderman, and sheriffs. It comprises two towns, viz. Kilkenny so called, and Irish-town, each of which sends two members to parliament, and both together are computed to contain about 20,000 inhabitants. This city was once of great consequence, as may be seen by the venerable ruins yet remaining of churches, monasteries, and abbeys, which even now in their dilapidated state exhibit such specimens of exquisite taste in

architecture as may vie with any modern improvements; and the remains of its gates, towers, and walls, show it to have been a place of great strength. Here too at different times parliaments were held, in which some remarkable statutes were passed. It has two churches, and several catholic chapels; barracks for a troop of horse and four companies of foot: a market is held twice in the week, and there are seven fairs in the year. Irish-town is more properly called the borough of *St. Canice*, vulgarly *Kanny*; the patronage of which is in the bishop of Ossory. The cathedral, which stands in a sequestered situation, is a venerable Gothic pile, built above 500 years; and close to it is one of those remarkable round towers which have so much engaged the attention of travellers. The bishop's palace is a handsome building, and communicates by a covered passage with the church. The castle was first built in 1195, on the site of one destroyed by the Irish in 1173. The situation in a military view was most eligible: the ground was originally a conoid, the elliptical side abrupt and precipitous, with the river running rapidly at its base: here the natural rampart was faced with a wall of solid masonry 4 feet high; the other parts were defended by bastions, curtains, towers, and outworks; and on the summit the castle was erected. This place, as it now stands, was built by the ancestors of the dukes of Ormond: here the Ormond family resided; and it is now in the possession of Mr. Butler, a descendant of that illustrious race. The college originally founded by the Ormond family is rebuilt in a style of elegance and convenience. The tholsel and market-house are both good buildings; and over the latter is a suit of rooms in which, during the winter and at races and allise times, assemblies are held. There are two very fine bridges of cut marble over the Nore. John's Bridge particularly is light and elegant. The Ormond family built and endowed a free school in this city. Here are the ruins of three old monasteries, called *St. John's*, *St. Francis's*, and the *Black abbey*: belonging to the latter are the remains of several old monuments, almost buried in the ruins; and the courts of the other are converted into barracks. The manufactures chiefly carried on here are, coarse woollen cloths, blankets of extraordinary fine quality, and considerable quantities of starch. In the neighbourhood also are made very beautiful chimney-pieces of that species of stone already mentioned, called *Kilkenny marble*: they are cut and polished by water, a mill for that purpose (the only one of its kind perhaps in Europe) being invented by the late Mr. Colles. The Kilkenny coal-pits are within nine miles of the town. This city came by marriage into the ancient family of Le Despencer. It was incorporated by charter from King James I. in 1609. The market-cross of Kilkenny continued an ornament to the city until 1771, when it was taken down; the date on it was MCCC. Sir James Ware mentions Bishop Cantwell's rebuilding the great bridge of Kilkenny, thrown down by an inundation about the year 1447. It appears also that St. John's bridge fell down by a great flood in 1564; and on the 2d October 1763, by another like circumstance, Green's bridge near the cathedral fell.—The borough of St. Canice, or Irish-town, always enjoyed very ancient prescriptive rights. A close roll of 5 Edward III. A. D. 1376, forbids the magistrates of Kilkenny to obstruct the sale of victuals in the market of Irish-town, or within the cross, under the pretence of custom for murage: and lest the ample grants made to Kilkenny might be interpreted so as to include Irish-town, the corporation of the latter secured their ancient rights by letters-patent 15 Edward IV. A. D. 1474. These renew their former privileges, and appoint a portrieve to be chosen every 21st September, and sworn into office on the 11th October. The portrieve's prison was at Troy-gate. When the mayor of Kilkenny came within Water gate, he dropt down the point of the city-sword, to show he claimed no pre-eminence within the borough,

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